

# THE MEDICAL JOURNAL OF AUSTRALIA

VOL. I.—27TH YEAR.

SYDNEY, SATURDAY, JUNE 29, 1940.

No. 26.

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### CEREBRAL COMPRESSION: A CLINICAL AND EXPERIMENTAL STUDY.

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THE freedom of expansion of an intracranial lesion is influenced to a certain extent by the limitation of free space in the cranial cavity. When a lesion does expand, it must do so by one of two methods or, as is usually the case, by a combination of these two methods. In the first place, a lesion such as an extradural hæmatoma expands primarily by displacing the brain, and there is no replacement of the brain tissue, as in the case of an invading neoplasm. If the expansion of the lesion is slow and extends over a period of weeks or months, there is a certain amount of softening of

the subjacent brain tissue; but mainly the expansion proceeds by a displacement of the intracranial contents.

The expansion in these cases occurs at the expense of the compressible elements in the cranial cavity, namely, the cerebro-spinal fluid channels and cisterns, the veins and venous sinuses, and, to a less extent, the arteries. The extent to which these elements can be compressed and still be compatible with life is limited, and can continue only so long as the vital parts of the brain are able to function under the abnormal conditions.

On the other hand, a lesion such as a malignant neoplasm expands largely by replacing the brain tissue by its own proliferating cells, and in this way is usually able to attain a greater size and still be compatible with life. It is only when the rate of growth of the lesion exceeds the rate of destruction of the surrounding brain tissue that actual displacement of the brain becomes evident.

When a malignant neoplasm is removed at operation a cavity is left behind. At the end of the operation the cavity is noted to have decreased somewhat in size owing to the expansion of the underlying brain tissue. This cavity will become walled off by glial tissue and filled with fluid, or it will become obliterated by the further growth of the neoplasm.

When, however, a lesion such as an extradural hæmatoma is evacuated, no brain tissue is removed with it, so that the brain and its contents must expand to fill in the cavity left by the hæmatoma. It has been noted, on removal of such lesions, that the time taken for the brain to expand varies in different cases. If the hæmorrhage is small, the brain will have expanded fully almost as soon as the blood has been evacuated. In the case of larger hæmorrhages the expansion rate of the brain is slower; but it has usually expanded fully by the time the surgeon is ready to close the wound.

There are occasions, however, when, after the removal of a very large hæmorrhage, the brain expands very slowly or does not appear to the naked eye to expand at all. Now something must happen in the brain as the result of compression to account for the rapid expansion on the one hand and for the slow expansion on the other after such a lesion has been removed. In the course of this study seven factors have been considered as having a possible influence on the expansion rate of the brain. They are: (i) the length of time the brain is compressed; (ii) the degree of pressure exerted by the expanding lesion; (iii) the rate of expansion of the expanding lesion; (iv) the natural elasticity of the brain; (v) the fluid content of the cellular and intercellular tissue; (vi) the blood pressure and blood volume of the intracerebral vessels; (vii) the pressure of the cerebro-spinal fluid.

It has been the object of this study to evaluate the importance of each of the above factors in relation to the expansion of the brain after it has been subjected to compression, and more particularly to discover the factor that is mainly responsible for the failure of the brain to expand fully on these occasions. As a prelude to this two cases are reviewed, as they were the reasons for this work being carried out. Both patients were studied and treated by W. V. Cone, of Montreal.

#### Reports of Cases.

**CASE I.—B.O.**, a female patient, aged twenty-five years, had a large extradural hæmatoma in the right frontal region. This patient had been knocked down by a motor car and was unconscious for a few minutes. On recovering she was rather dull mentally and felt nauseated. She was immediately taken to hospital, and shortly after her admission she again lapsed into unconsciousness. An emergency operation was performed (about two hours after the accident) and a large extradural hæmatoma was found over the right frontal lobe, pushing the dura two and a half to three centimetres away from the bone. When the clot was cleared out it was noted that the brain did not expand visibly. There was only slight improvement in the patient's condition following the operation, and on the next day the skull was reopened and a further collection of clot was removed. On this occasion it was noted that the brain had expanded only about 50% since the first operation, and it did not expand any

further when the second collection of clot was removed. The patient's condition did not improve and she died thirty-six hours later. During the post-operative course the blood pressure was not below normal until just before death, and the pressure of the cerebro-spinal fluid was elevated.

**CASE II.—E.C.**, a female patient, aged twenty-nine years, had a large extradural hæmatoma in the right temporal region. This patient tripped and fell while walking downstairs and was rendered unconscious for a few minutes. Shortly after recovering she retired to bed without assistance. The following morning she was found in her bed in deep coma, and she was then taken to hospital by ambulance over a distance of 90 miles.

An emergency operation was performed (about twenty to twenty-four hours after the accident) and an extradural clot, slightly smaller than that found in the first case, was found in the right temporal region. When this was removed it was noted that the brain did not expand visibly. The patient did not recover. During the patient's post-operative course the blood pressure did not fall below normal until just before death and the pressure of the cerebro-spinal fluid was elevated.

These two cases had two points in common: (a) the expanding lesions were large, more so in the first case; and (b) the brains did not expand appreciably when the hæmatomata were removed. The differences in these cases were that in the first case the lesion expanded rapidly and was present for a relatively short time, while in the second case it was slowly progressive and was present for a relatively long time.

In order to assess the relative importance of the above seven factors a series of experiments was carried out, and for this purpose a special head-holder and recording apparatus were designed to record the movements of the surface of the brain. These movements were recorded on the smoked drum of a Brodie-Stirling kymograph, in relation to a constant base line and a time-marker working at intervals of one second.

Figure I is a silhouette photograph of the component parts of the recording apparatus. Its description is as follows:

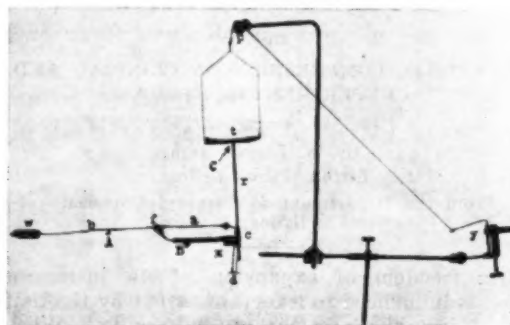


FIGURE I.

Silhouette photograph of the recording apparatus. A: first unit; B: second unit; C: third unit; a: proximal part of unit A; b: distal part of unit A; c: cylindrical guide; d: disk; f: fulcrum; p: pulley; r: rod of tray; t: tray; w: flag-writer; x: point at which unit B is supported; y: point at which silk thread is fixed.

The unit A is made of aluminium. It consists of a disk (d), which is slightly convex on its under surface and measures 18 millimetres in diameter. This disk was designed to rest lightly on the brain surface. The disk

is joined at right angles to the main part of the unit by two slender vertical rods. The horizontal part of the unit rests on a fulcrum (*f*) at such a point that the proximal part (*a*) is exactly half the length of the distal part (*b*). In this manner the movements of the distal end, to which is fixed the flag-writer (*w*), are exactly double those of the disk and consequently of the brain surface. The part of the unit proximal to the fulcrum is very slightly heavier than the distal part, so that the disk follows accurately the movements of the brain surface.

Unit *B* consists of a curved arm of brass, at one end of which is the fulcrum (*f*) that supports unit *A*. At the other end there is a short cylinder (*c*), which acts as a guide for the rod (*r*) that extends vertically downwards from the tray (*t*) of unit *C*. Unit *B* is firmly fixed to the head-holder (Figure II) by metal supports attached at the point *x* (Figure I).

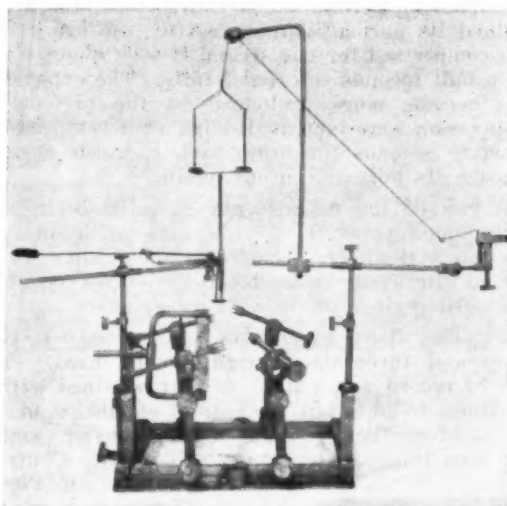


FIGURE II.

Photograph of recording apparatus attached to the head-holder, and in the position used during recording.

Unit *C* is also made of brass and consists of a tray (*t*) five centimetres square, from the under surface of which is attached a thin metal rod (*r*). The lower end of this rod passes through the cylinder (*c*) and its lower end is suspended just above the disk. The tray is suspended by two metal arms and a silk thread. The latter passes over a pulley (*p*) and is fixed to one of the supports at the point (*y*). This unit is also fixed firmly to the head-holder by means of metal supports (Figure II). The tray, rod and arms weigh exactly one ounce.

To manipulate the apparatus the silk thread is released and the metal rod (*r*) is allowed to rest on the disk (*d*). In this manner a weight of one ounce is allowed to press on the brain over the area covered by the disk (approximately 2.5 square centimetres) for any desired length of time. This pressure may be increased by placing additional weights on the tray.

In each of the experiments cats were used under "Dial" anaesthesia. Four surgical exposures were used. The brain of each animal was exposed in the left parietal region by the removal of bone and dura over an area slightly larger than that of the aluminium disk. The other three procedures were the exposure of both common carotid arteries, of the abdominal portion of the aorta and of the spinal theca in the lumbar region. The latter three exposures were made only when the particular

experiment warranted it. When the necessary exposures were made, the animal's head was fixed in the head-holder and the recording apparatus was attached, the disk resting lightly on the surface of the exposed area of brain. The animal and apparatus were then moved close to the kymograph (Figure III) until the tip of the recording flag-writer rested on the base line which was made by another flag-writer a few inches in advance. Immediately underneath was a third flag-writer, which marked out intervals of one second. The kymograph was then set in motion by an electric motor and the movements of the surface of the brain were recorded. Records of the shorter times only will be presented in this report, as the longer records are too lengthy to include. To avoid confusion the results will be described in terms relating to the brain surface and not to the movements of the flag-writer. Thus it must be remembered that a record above the base line indicates a depression of the brain surface, while a record below the base line indicates an expansion of the brain.

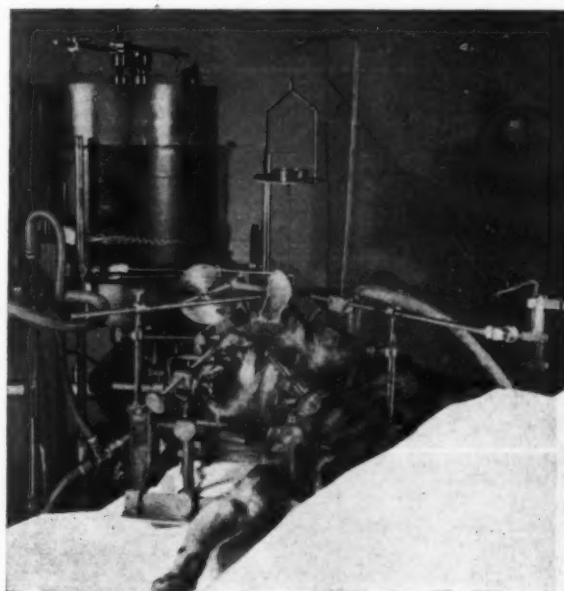


FIGURE III.

Photograph taken after one of the experiments to show the complete set-up in action. The uppermost record represents the blood pressure. The manometer and its flag-writer can be seen at the left of the photograph. The middle flag-writer records the movements of the brain surface. The lowest flag-writer marks out the time intervals. The flag-writer making the base line is hidden behind the time-marker.

The experiments have been divided into five groups for the purpose of evaluating the relative importance of each of the above factors:

**Group I** [to evaluate factors (i), (ii) and (iii)].—Weights of one, two and three ounces were allowed to compress the brain for periods varying from one second to ten minutes. The weights were applied both suddenly and gradually.



*Group II* [to evaluate factor (iv)].—The same procedures were carried out on the dead animal for times varying from one second to thirty minutes.

*Group III* [to evaluate factor (v)].—Distilled water and 25% glucose solution were injected into the left common carotid artery. Weights were also applied under these conditions.

*Group IV* [to evaluate factor (vi)].—The intracranial blood pressure and blood volume were raised by elevation of the animal's hind end and by the injection of adrenaline; and lowered by clamping of the carotid arteries.

*Group V* [to evaluate factor (vii)].—The pressure of the cerebro-spinal fluid was raised by injecting saline solution into the lumbar subarachnoid space, and lowered by allowing the cerebro-spinal fluid to escape.

Each of the above experiments was carried out on several animals. Usually more than one experiment was performed on the same animal, in which case the order was varied to eliminate any

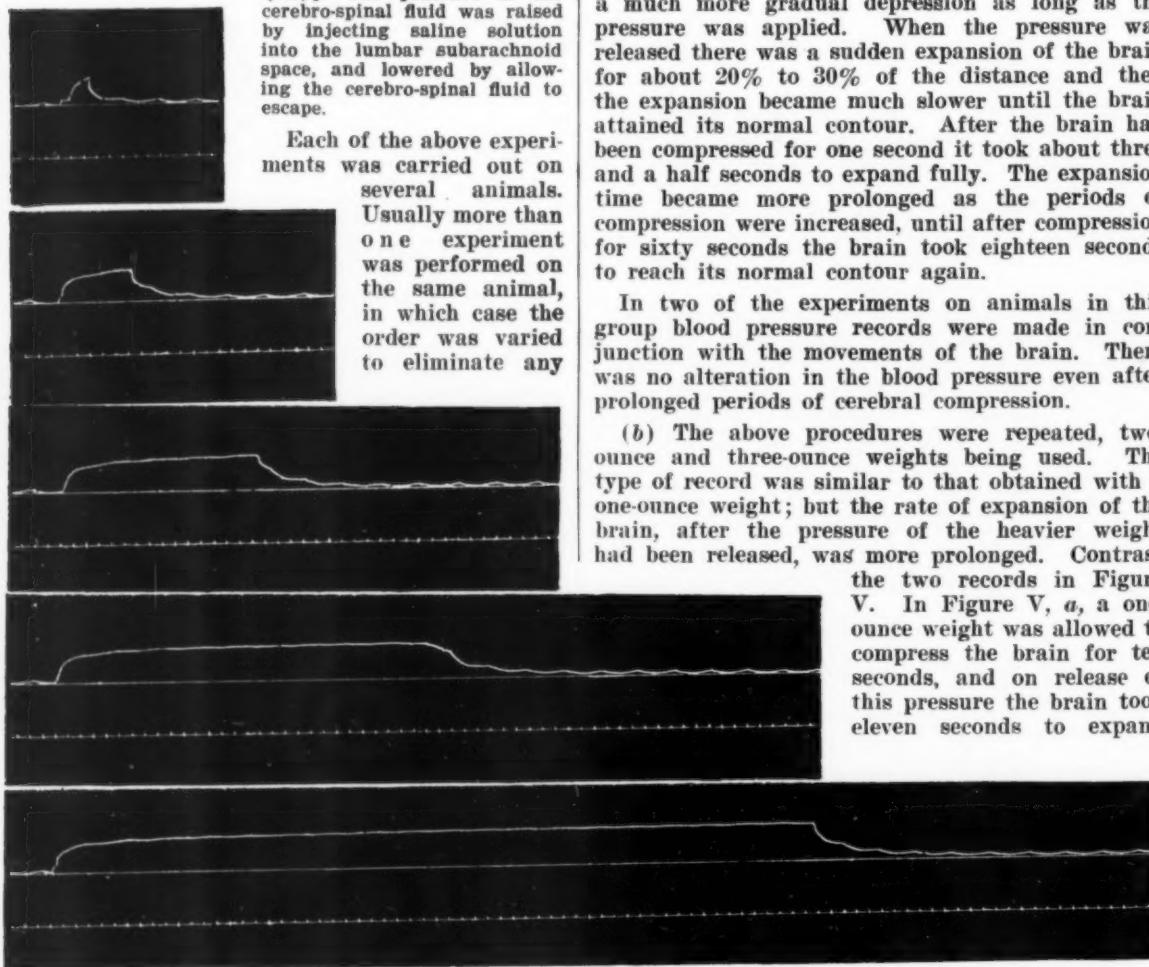


FIGURE IV.  
Records showing the variations in the times taken for the brain to expand fully after it was compressed by a one-ounce weight for periods varying from one second to sixty seconds. Each section follows in order from top to bottom. Time markings denote one-second intervals.

influence from the preceding experiment. In the following pages the experiments of each group will be discussed in greater detail.

#### Experimental Procedures.

##### *Group I.*

(a) The left parietal exposure of the brain was made and the recording apparatus was set up with the flag-writer tip resting on the base line. The

kymograph was then set in motion and the metal tray was released so that a weight of one ounce was allowed to press on the brain for periods varying from one second to ten minutes. Periods of rest were allowed between these times to permit the brain to expand to its normal contour, and the times taken for the brain to expand fully were carefully recorded.

In each record (Figure IV) there was a sudden depression of the brain, and this was followed by a much more gradual depression as long as the pressure was applied. When the pressure was released there was a sudden expansion of the brain for about 20% to 30% of the distance and then the expansion became much slower until the brain attained its normal contour. After the brain had been compressed for one second it took about three and a half seconds to expand fully. The expansion time became more prolonged as the periods of compression were increased, until after compression for sixty seconds the brain took eighteen seconds to reach its normal contour again.

In two of the experiments on animals in this group blood pressure records were made in conjunction with the movements of the brain. There was no alteration in the blood pressure even after prolonged periods of cerebral compression.

(b) The above procedures were repeated, two-ounce and three-ounce weights being used. The type of record was similar to that obtained with a one-ounce weight; but the rate of expansion of the brain, after the pressure of the heavier weight had been released, was more prolonged. Contrast the two records in Figure V. In Figure V, a, a one-ounce weight was allowed to compress the brain for ten seconds, and on release of this pressure the brain took eleven seconds to expand

fully. In Figure V, b, a three-ounce weight was used for the same period and the brain took thirty-two seconds to reach its normal contour when the pressure had been released.

(c) In order to ascertain the relative effects of rapidly and slowly expanding lesions a more prolonged experiment was carried out on four cats. In two of the animals a small burr hole was made



in the left parietal region and a few moistened granules of "Normacol" were packed into the extradural space, the same amount of "Normacol" being used in each case. The "Normacol" granules have the capacity of absorbing large quantities of water, and they thus formed an excellent very slowly expanding extradural lesion. A small brass button was then screwed into the burr hole to prevent the "Normacol" from escaping and the scalp wound was sutured. The animal was placed in a warm room and left for twenty hours.

After this time the wound was reopened and the brass button was removed. A blunt instrument was passed through the centre of the "Normacol"

to the dura, and in each case the depth of the lesion from the inner table was eight milli-

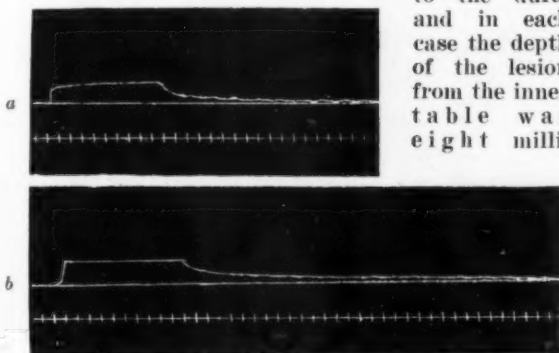


FIGURE V.

Records showing the difference in time taken for the brain to expand fully after it was compressed by a one-ounce weight (a) and a three-ounce weight (b) for ten seconds. Time markings denote one-second intervals.

metres. The "Normacol" was quickly removed and the time taken for the brain to expand fully to its original contour was noted. In the first animal this took four and a half minutes, and in the second four minutes.

In the other two animals the procedure was similar, except that a small ball of "Plasticine" was used in place of the "Normacol". This was forced in through the burr hole until it had pushed the brain eight millimetres away from the inner surface of the skull. This procedure was used to simulate a rapidly expanding lesion. When the "Plasticine" was removed twenty hours later the times taken for the brain to expand fully were much longer than in the two experiments in which the slowly expanding "Normacol" granules had been used. In the experiment on the first animal the time was about twenty-five minutes, and in that on the second it was about eighteen minutes.

It must be admitted that these procedures were not so accurate as those in which actual tracings of the brain movements were made. The difference in time, however, in the two procedures was so pronounced that there could be no mistake about it.

In this group of experiments the expansion rate of the brain, after the removal of the compressing agent, varied directly with (a) the length of time the brain was compressed, (b) the degree of pressure exerted by the compressing agent, and (c) the rate at which the lesion expanded.

### Group II.

The first two experiments described above [(a) and (b)] were repeated on two dead animals in an effort to assess the degree of expansion produced by the natural elasticity of the cerebral substance in the absence of the other factors. The usual left parietal exposure was made and the recording apparatus was set up. The animal was then killed by a small amount of ether injected into the heart. There was no alteration in the contour of the brain following the ether injection. A record was taken over the next half-hour, and during this time the brain contracted slightly. This is shown (Figure VI) at the beginning of the top record. A weight of one ounce was then applied to the brain for periods varying from one second to thirty minutes. Each time the pressure was released the brain expanded less completely (Figure VI), until after thirty minutes' compression there was only a very slight degree of expansion. This persisted even after further application of pressure for varying times.

### Group III.

In Group III the importance of the interstitial fluid was considered. Four animals were used, and these were injected first with 25%

glucose solution and then with distilled water. In each animal the usual left parietal exposure of the brain was made. The left common carotid artery was then dissected

out. A needle was tied into the vessel and this was led by rubber tubing to a flask containing a 25% glucose solution fixed at the level of the ceiling. The fluid was permitted to run in at the rate of one drop per second. The

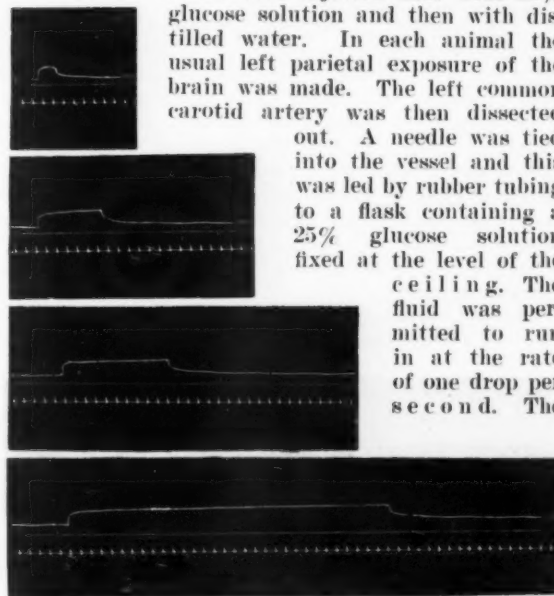


FIGURE VI.

Records taken on an animal starting 30 minutes after it had been killed. Note the progressively diminishing expansion on release of the pressure. At the end of a 30-minute period of compression there was only about one millimetre expansion.

recording apparatus was then set up and the kymograph was set in motion. The time-marker, in this instance, marked off one-minute intervals.

Six minutes after the injection was started the brain began to contract. This continued slowly until it reached a point of maximum contraction after approximately one and a quarter hours. The injection was then stopped and nothing further was done during the next three hours. During this time

the brain expanded only slightly and very slowly. At the end of the three hours a one-ounce weight was applied for periods of one to thirty seconds. When the weight was released there was a rapid expansion of the brain to its previous level. There was no secondary delayed expansion, and although this was repeated several times, there was no additional expansion.

The intraarterial injection was then changed from glucose to distilled water, and this was allowed to flow into the artery at the rate of one drop per second. After four minutes the brain began to expand further, and within fourteen minutes it had attained its normal contour. At this point the one-ounce weight was again applied. On release of the weight there was a rapid partial expansion, and then a more gradual expansion until the normal contour was attained; this corresponded exactly with the records obtained in Group I.

#### Group IV.

In Group IV the effects of alterations in the blood pressure and intracerebral blood volume were studied. Three animals were used. In each animal both common carotids were dissected out, in addition to the usual left parietal exposure of the brain, and lastly the abdominal section of the aorta was exposed. A glass cannula was tied into the aorta and connected, by means of rubber tubing, to a mercury manometer, the whole system being filled with 2.8% sodium citrate solution to prevent clotting. The blood pressure was recorded by means of an aluminium wire. The lower end of the wire rested on the mercury, and at its upper end was attached a flag-writer. The recording apparatus was attached and the tip of the flag-writer was placed on the base line (Figure III) of the kymograph.

The intracranial blood pressure and blood volume were raised in two ways. First, the caudal end of

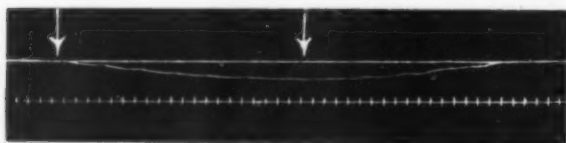


FIGURE VII.

Record showing the expansion of the brain when the amount of intracerebral blood was increased by elevating the animal's caudal end. The left arrow indicates the point at which this was done, and the right arrow indicates the point at which the animal was placed in the horizontal position again.

the animal was elevated above the level of the head as far as possible without disturbing the recording apparatus. This resulted in an increase in the blood volume at the cephalic end of the animal. There was a rapid expansion of the brain (Figure VII), which returned to normal as soon as the animal was placed in the horizontal position.

Next, the blood pressure was raised by the intravenous injection of two minims of adrenaline. The blood pressure, which was between 80 and 95 millimetres of mercury, rose to between 160 and 180 millimetres of mercury (Figure VIII). When

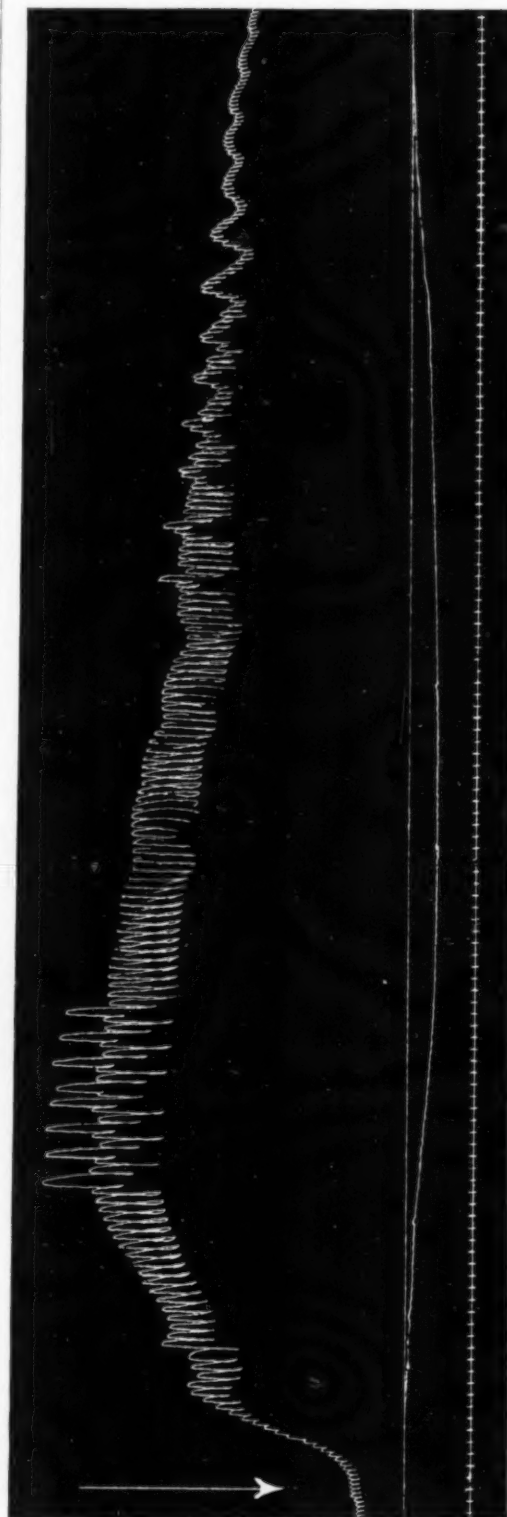


FIGURE VIII.  
Record showing the expansion of the brain corresponding with elevation of the blood pressure. The arrow indicates the point at which two minims of adrenaline were injected intravenously.

it had reached about 120 millimetres the brain began to expand. As the effect of the adrenaline wore off the blood pressure began to fall, and when it reached about 120 millimetres again the brain had contracted to its normal contour. This was repeated three times on each animal with the same results.

In order to diminish the intracerebral blood pressure and blood volume, the flow through the carotid arteries was obstructed. There was no effect when the left and right common carotid arteries were clamped separately. This was probably due to the extensive circulation overlap from each vessel. When both arteries were clamped together there was a rapid depression of the brain surface (Figure IX), and when the clamps were

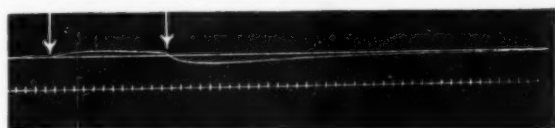


FIGURE IX.

Record showing the contraction of the brain when both common carotid arteries were clamped (left arrow), and the temporary expansion when the clamps were released (right arrow).

removed the brain expanded beyond its usual limits and then contracted gradually until it reached its normal contour. This temporary over-expansion was probably due to the sudden rush of blood into the partially empty vessels.

With both carotid arteries clamped a weight of one ounce was allowed to compress the brain for periods varying from one to thirty seconds. As soon as the vessels were clamped there was a slight depression of the brain surface (Figure X), and this depression increased when the weight was applied. On release of the weight there was only a partial expansion of the brain, but as soon as the clamps were removed it expanded fully to its normal contour. When two-ounce and three-ounce weights

meninges were exposed in the lumbar region. The recording apparatus was arranged in position and the kymograph was set in motion. A hypodermic needle was inserted into the subarachnoid space and the cerebro-spinal fluid dropped out very

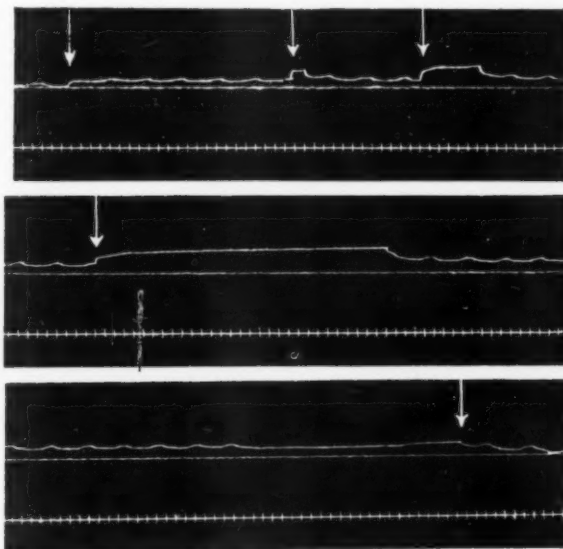


FIGURE X.

Three records showing the times taken for the brain to expand after compression with a one-ounce weight with both common carotid arteries clamped. Records follow each other from above downwards. First arrow indicates point of clamping of the carotid arteries. Second, third and fourth arrows indicate points of compression for one, six and thirty seconds respectively. Fifth arrow indicates point of release of clamps.

slowly. The manometric pressure was less than five millimetres of water. Half a cubic centimetre of normal saline solution was then injected into the subarachnoid space and there was an immediate expansion of the brain (Figure XI). The pressure of cerebro-spinal fluid after the saline solution had

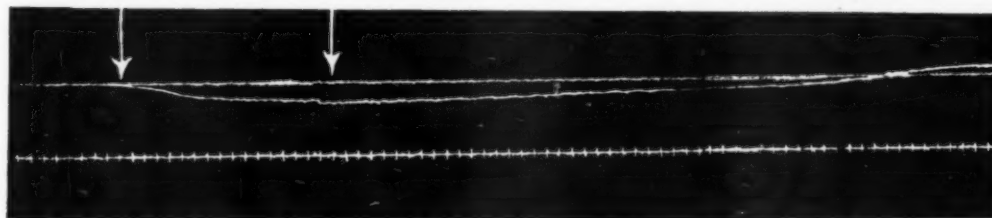


FIGURE XI.

Record showing expansion of the brain when the pressure of the cerebro-spinal fluid is raised (left arrow), and the contraction when the cerebro-spinal fluid is allowed to escape slowly (right arrow).

were used the immediate expansion was slightly less; but the brain expanded fully when the clamps were removed, although more slowly.

#### Group V.

The experiment in Group V was carried out on two animals to determine the effect of the pressure of the cerebro-spinal fluid on the recovery time. Besides the usual left parietal exposure, the spinal

been injected was 11 millimetres and 13 millimetres of water in each animal respectively.

The cerebro-spinal fluid was then allowed to escape through the needle. As the pressure of the cerebro-spinal fluid fell the brain contracted, and when the pressure had fallen to its original level the brain had assumed its normal contour. As more fluid escaped the brain became slightly depressed. At this point a one-ounce weight was



allowed to compress the brain for periods varying from one to thirty seconds. On release of the pressure the brain rapidly resumed the position it had adopted after the escape of cerebro-spinal fluid had been stopped. The time taken for the brain to expand was only slightly less than in the cases in which the pressure of the cerebro-spinal fluid was normal. When a few minims of saline solution were injected into the lumbar subarachnoid space the brain immediately expanded to its normal contour. At this point the pressure of the cerebro-spinal fluid, as far as could be judged, was the same as at the beginning of the experiment.

#### Discussion.

Two cases have been reported in which the brain did not expand visibly after the removal of an intracranial expanding lesion. It has been the object of this study to discover why this failure to expand should occur. With this in view, a series of experiments has been carried out on cats under "Dial" anaesthesia.

The first group of experiments was carried out to compare the times taken for the brain to expand after the release of pressure that was varied in the length of time it was allowed to act, in its intensity and in the suddenness with which it was applied. These experiments were carried out on several animals, and on each occasion the results were constant. The results corresponded very closely with the findings in the two human cases, in that full expansion was delayed when the compression was present for a long time, when the compressing agent was large and when it was sudden in its onset.

The second, third, fourth and fifth groups of experiments were performed to assess the importance of the natural elasticity of the brain, of the intracellular and interstitial fluid, of the blood pressure and blood volume of the brain, and of the pressure of the cerebro-spinal fluid respectively as influences of the recovery time when an expanding lesion had been removed.

In the second group, in order to assess the importance of the natural elasticity of the brain, the remaining factors were eliminated as far as possible. By killing the animal the blood pressure and cerebro-spinal fluid pressure were reduced to zero; and by applying pressure for increasing lengths of time as much blood and fluid as possible were expelled from the interstitial tissues. A point was reached at which the amount of expansion on release of the pressure became constant even after several further periods of pressure. At this point the expansion was very prompt, taking only half to one second even after ten minutes' compression, and there was no secondary delayed expansion. This means that the natural elasticity of the brain accounts for a slight degree of the prompt part of the expansion of the brain when the compressing agent is removed, but it is not responsible for any part of the delayed expansion.

In the fourth group the recovery time was studied in relation to the blood pressure and cerebral blood volume. In each case it was found that the contour

of the brain responded promptly to any changes in the blood pressure or volume. It was also found that there was no undue delay in the recovery time on the release of pressure when the intracerebral blood pressure and volume were lowered. The expansion stopped at about the half-way point; but when the clamps were removed from the carotid arteries the brain expanded fully in a very short time. It is concluded from this that the blood pressure and blood volume of the brain are not responsible for any delay in expansion on release from cerebral compression.

Similar results were obtained in the fifth group of experiments in relation to the pressure of the cerebro-spinal fluid. It was shown that the brain expanded and contracted promptly in response to changes in the pressure of the cerebro-spinal fluid. And when the cerebro-spinal fluid pressure was lowered there was no material alteration in the recovery time when the compression was released.

The only positive results were obtained in the third group, when the interstitial and intracellular fluid was considered. It has been shown that this is the slow factor in the process of full expansion. When fluid was extracted from the cerebral tissue by means of 25% glucose solution the brain expanded a certain amount promptly and further expansion to its normal contour was exceedingly slow. If distilled water was then injected into the blood stream the expansion was speeded up considerably, but was still much slower than in the experiments in which the interstitial fluid was not altered.

#### Summary and Conclusions.

As an intracranial lesion expands, it does so primarily at the expense of the more easily compressible constituents of the brain, namely, the subjacent venous and cerebro-spinal fluid channels. If the lesion is removed at this stage the brain will expand promptly, as it is forced out by the return of the blood and cerebro-spinal fluid to their normal channels and to a slight extent by the natural elasticity of the cerebral substance. If, however, the lesion should become very large and exert its pressure over a relatively long time, additional fluid is expressed from the interstitial tissue of the brain and perhaps also from the various cells. In such cases, when the lesion is removed there will be a certain degree of expansion due to the return of blood and cerebro-spinal fluid and to elasticity. Complete expansion will depend on how much interstitial fluid has been expressed by the lesion. If the amount is small the brain will soon resume its normal contour; but if it is large several hours may elapse before the brain expands fully. The rapidity with which the lesion expands also seems to influence the rate of expansion. In the case of a slowly expanding lesion the brain apparently accommodates itself so that very little interstitial fluid is expressed, while if the lesion expands rapidly a relatively large amount of fluid is expressed from the interstitial tissues.

Thus it can be seen that the length of time the brain is compressed, the degree of pressure exerted

and the rate of expansion of the lesion are the primary or indirect factors controlling the rate of expansion of the brain after the compressing agent has been removed. The loss of fluid from the interstitial tissues and possibly from the cellular elements is secondary to the influence of the above three factors, and is the direct factor influencing the expansion of the brain.

It is not necessary that all three should be present to the same pronounced degree, for if one is slight the same result may occur when the other two factors are more pronounced. This is demonstrated in the two clinical cases that have been reviewed. In the first the lesion was very large, rapidly expanding, and exerted its pressure for less than two hours. In the second case the lesion was also large, but slightly less so than the first. It expanded slowly, but exerted its pressure for several hours longer.

The physico-chemical factors controlling this exchange of fluid as the result of pressure are another problem and have not been considered in this study. Further presumptive evidence in support of the above conclusions may be obtained from the two clinical cases described. In each case the blood pressure readings did not fall below normal until just before death, and the pressure of the cerebro-spinal fluid was elevated in both cases during the post-operative course; but even these factors were not sufficient to force the brain out to its normal contour when the lesions were removed.

This condition must be very uncommon, and to be brought about it seems necessary that the lesion should compress the brain for some hours, that it should be large and exert a considerable degree of pressure, and that it should expand rapidly. This study, applied clinically, supplies another reason for the surgical removal of an intracranial expanding lesion at the earliest opportunity in cases in which such a removal is possible.

#### STUDIES IN TUBERCULOSIS. VI: BY-EFFECTS OF THE PURIFIED PROTEIN DERIVATIVE OF TUBERCULIN AS USED FOR THE MANTOUX TEST.<sup>1</sup>

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In the course of the application of the intracutaneous tuberculin test to some seven thousand persons during the last two years or so, employing the purified protein derivative of tuberculin, a few untoward reactions have been encountered, and these are here described.

##### Sharp Local Reactions.

The sharp local reactions encountered, though not unusual or very untoward, are mentioned for the

sake of completeness. The greater number of the tests were made with a single injection of only 0.025 cubic centimetre containing 0.00125 milligramme of the purified protein derivative (one quarter dose of the usual second-strength solution), as described by Anderson and Harvey,<sup>(1)</sup> a method which is very seldom followed by the large or necrotic reactions occasionally seen when the usual doses contained in 0.1 cubic centimetre are injected. Sharp reactions do occur, but they are seldom large enough to be inconvenient. In the subjects so tested, sharp reactions, that is to say, reactions accompanied by vesiculation or ecchymosis even of the slightest degree, occurred in 2.3%; but if persons under the age of fifteen years were omitted from the calculation the percentage would be 4.1. All those presenting these sharp reactions were asked whether the arm had been sore or irritable, but only one in ten (0.4% of the total number tested) replied that the arm had been sore. About 0.2% complained that the arm had been sore when the reaction was neither large nor intense or when there had been no reaction at all, and it is possible that in these cases the use of the word "sore" may have been somewhat hyperbolic.

##### Pyrexial Reactions.

Among the persons tested were over five hundred hospital patients, whose temperature was being recorded, and of these about a hundred were suffering from tuberculosis. Among the tuberculous patients there was none who during the ensuing week developed pyrexia which was attributed to the test, although many were slightly pyrexial all the time. Among the non-tuberculous patients several had sharp pyrexial reactions.

A girl, aged nineteen years, suffering from rheumatoid arthritis, who received an intracutaneous injection of 0.005 milligramme of the purified protein derivative and who exhibited an intense local reaction, on the evening of the day of the injection had an oral temperature of 103° F. (39.5° C.) and her temperature took two days to subside to normal. On the day after the injection she had a scarlatiniform rash and felt very ill. A week later an intracutaneous injection of 0.00125 milligramme of purified protein derivative was administered; this time her temperature rose to 102° F. (39° C.) and she was again very ill, but there was no rash. Neither injection produced a recognizable focal reaction.

A woman, aged fifty-two years, suffering from rheumatic heart disease and recurrent joint swellings, who received an intracutaneous injection of 0.005 milligramme of the purified protein derivative, exhibited an intense local reaction and her temperature rose to 100° F. (38° C.). The injection was later repeated with the like effect. Neither injection produced a recognizable focal reaction.

A nurse, aged twenty-four years, in robust health, who received an intracutaneous injection of 0.00125 milligramme of the purified protein derivative and whose local reaction was the largest encountered, with a raised area 22 millimetres in diameter, had a temperature of 100° F. (38° C.) eight hours after the injection.

Since two of these subjects suffered from rheumatic disease, about a dozen other persons suffering from rheumatic diseases were tested, but none had any pyrexial reaction. The resemblance in the behaviour of tuberculosis and rheumatic disease has been the subject of comment for many years.

<sup>1</sup> Work carried out with the aid of a grant from the National Health and Medical Research Council. From the Royal North Shore Hospital of Sydney Institute of Medical Research.

According to Baldwin, Petroff and Gardner,<sup>(2)</sup> it was found twenty years ago that tuberculin would produce focal reactions in some persons suffering from arthritis, and hence tuberculin has been employed in the treatment of arthritis. The literature about the resemblances and analogies of tuberculosis and rheumatism has recently been reviewed succinctly by Poynton and Schlesinger.<sup>(3)</sup>

#### Languor and Malaise.

Five subjects, all in good health, said that they felt languid or unwell after intracutaneous injections of the purified protein derivative. Three of these had presented reactions classified as doubtful to injections of 0.00002 milligramme (the orthodox first-strength injection) and massive reactions to injections of 0.005 milligramme (the orthodox second-strength injection) and there was reason to think that they had been slightly febrile after the latter.

#### Axillary Discomfort.

A few subjects, who did not exhibit sharp local reactions, said that they had experienced transient slight discomfort in the axilla. There had been no error in the technique of injection in these cases and no recognizable sepsis was present.

#### Asthma.

Two subjects who were asthmatic experienced exacerbations of their asthma.

A man, aged forty-eight years, who was tuberculous and whose local reaction to an intracutaneous injection of 0.00125 milligramme of the purified protein derivative was rather sharp, had a severe paroxysm of asthma on the night of the injection, and his breathing was wheezy for a month; but this was not a rare experience for him.

Another man, aged fifty-three years, an asthmatic, who reacted locally to an intracutaneous injection of 0.00125 milligramme of the purified protein derivative, had his worst paroxysm of asthma for some years on the night of the injection and his breathing was wheezy for some weeks.

The idea of treatment with tuberculin was suggested to the medical attendants of these subjects but was not pursued.

#### Urticaria.

Seven subjects on the day after the test experienced urticarial eruptions. In no case did an urticarial wheal appear at the site of the injection, and in most of the cases there were only a few wheals. All seven had suffered from urticaria previously. One, the daughter of a tuberculous mother, had not had urticaria for many years. Three of the subjects exhibited no local reaction to the injection at all.

#### Reactions in Tuberculous Foci.

In no case was the test followed by any recognizable reaction in tuberculous foci. All the tuberculous subjects were questioned at the time of the examination of the reactions and again, when practicable, a week later, and none reported any untoward symptom. One girl, aged fourteen years, who had tuberculous glands in the neck, experienced transient slight discomfort in the axilla, but none in the neck.

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### CRYPTOPHTHALMOS OR ABLEPHARIA: A SURVEY OF THE CONDITION WITH A REVIEW OF THE LITERATURE AND THE PRESENTATION OF A CASE.

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AND

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EMBRYOLOGICAL failures are not always destined for Nature's discard. These failures, often ranging from minor faults to gross travesties of the human form, may occur separately or may be multiple, and arouse degrees of interest varying according to the knowledge and taste of the observer and in relation to the involvement of vital or less significant structures. In those cases in which seemingly gross failures are compatible with life, not only the academician, but also the practitioner, finds spontaneous interest arising.

Cryptophthalmos or ablepharia is an example in which quick interest kindles and rises rapidly. When the condition is bilateral the absence of eyelids, palpebral fissure, eyelashes and eyebrows, together with the wide flattened bridge of the nose, combine to produce a striking poverty of expression (Figure I). The skin of the forehead glides over a subnormal, low-lying supraorbital ridge, surmounts a bulge arising from the orbital caves, and merges imperceptibly with the skin of the cheek.

#### Terminology.

The term "ablepharia" was designed to demonstrate the superficial anomaly, namely, the absence of eyelids. Zehender apparently was dissatisfied with this term and substituted cryptophthalmos—"hidden eye"—which appears to be an apt coinage, though it omits reference to the absence of the eyelids. The disadvantage of Zehender's term lies in the fact that in some instances the eye may not only be hidden but also absent. Terms such as "symblepharon" (adhesion of the palpebral and ocular conjunctival surfaces) and "ankyloblepharon" (adhesion of the eyelids), which have been used by writers, preserve this fly of obvious error in the amber of truth, for both mistakenly imply that the eyelids have been present.

#### The Anatomy.

A description of the condition cannot be confined to superficial structures; consequently it will be necessary and useful to describe the ocular tissues in an anatomical order, and to indicate the inconsistent findings. Much of the following has been extracted from Mann's account.<sup>(1)</sup>



Usually the eyebrows are absent. In two instances (in the available literature) the eyelashes are recorded as present, in spite of Mann's statement that there are never any traces of lashes. Eyebrows were also present in those two cases. Palpebral fissures may be absent or may be represented by a linear horizontal scar of varying length. There may be a puckering of the skin over the site of the centre of the cornea, and this puckered tissue may



FIGURE I.

The photograph shows bilateral cryptophthalmos. Note the equatorial groove over the left eye, and the disposition of the hair on this side.

be adherent to the surface of an eyeball. In the skin occupying the position of the lids, tarsus and Meibomian glands have been found. Details concerning the lachrymal apparatus are scanty; but in two cases (those of Zehender<sup>(3)</sup> and Newman<sup>(7)</sup>) its absence is specifically noted. In Elliot's<sup>(5)</sup> case, in which cryptophthalmos was present on one side and partial ablepharia on the other, tears flowed into the eye on the less affected side.

All muscles are present as a rule; the skin is corrugated by their action, or the eyeball moves in response to the will or to light.

The conjunctivæ and cornea are rarely recognizable; the anterior chamber may contain vitreous or may be obliterated by an adherent iris. The lens may be absent. Retinal elements are usually not involved in the anomalous process.

#### Coexistent Abnormalities.

Although the principal abnormality may be accompanied by other abnormalities, this is not necessarily the rule. According to Mann, these coexistent abnormalities may be restricted to the homolateral side, when the condition is unilateral.

A wide range of abnormalities which have been mentioned as being present include the following:

syndactyly of the hands and feet, genital malformation, cleft palate, harelip, facial cleft, atresia of the larynx, ventral and umbilical hernia, absence of kidneys and uterus, meningo-encephalocele, and malformed conchæ.

#### Report of a Case.

The following details are given concerning a child born in Sydney during February, 1940.

The mother, aged fifteen years, is Oriental, and the father's age was about twenty to twenty-five years; his nationality is not known. From indefinite information the baby was born almost at full term and weighed six pounds six ounces. The pregnancy was normal, the presentation was left occipito-anterior and the labour was normal, except that the second stage (six hours) was short for a young *primipara*. The placenta was normal.

An examination of the baby on the tenth day (Figure II) enabled the following description to be given. The baby is well nourished and the skin is slightly icteric in colour. The hair is black and normal in distribution, except that a tongue of hair on the left side overlies the eye on that side. Eyebrows in the true sense are absent, though the hair at the upper margin of the orbital fossa is longer than that just above it. Both fontanelles are open; the anterior fontanelle is greater in extent than the posterior. The orbital fossæ appear to be fully developed in length and breadth, but seem to be shallower than normal. From the outer angles of the fossæ a depression may be traced horizontally backward and slightly upward, ending above the ear on each side.



FIGURE II.

The appearance of the baby on the tenth day.

An unusually broad area separates the eyes, the prominence of the bridge of the nose being conspicuously absent. The eyes are covered with skin, which is continuous with that of the forehead and the cheek. On the left side the site of the palpebral fissure is represented by a short linear, upwardly slanting groove, measuring about 5.0 millimetres in length. This groove is devoid of eyelashes. On the right side a small pit constitutes the only evidence of a palpebral fissure. When the baby cries and when the eye turns outwards the pit deepens; the assumption can be made that the eye is attached to the base of this pit. The right eyeball is larger than the left.

The nostrils are patent and are set at a higher level than the tip of the nose, which is marked by a double groove arising near the superior end of the philtrum and following the contour of the nostrils. Lips, tongue and palate are normal. The ears are symmetrically placed and their general pattern is normal. On the left side the ear lies in a shallow bony depression and thus comes to be overhung by the skin of the side of the scalp. Well-formed nails occur on all the fingers with one exception. The fingers are webbed and the extent of the webbing is partly shown in Figure II.

The nails and toes of the right foot are deformed, with a weak attempt at separation of the little toe from its fellows. On the left foot the nail formation is poor. Webbing joining the three middle toes distinguishes an otherwise normal foot.

The back appears normal, with no external sign of *spina bifida*.

The first impression of the external genitalia suggests that the baby is a female (Figures II and III). There are apparently bilateral *labia majora* of a texture coarser than normal. When the labia are parted a genital organ



FIGURE III.  
The external genitalia with the predominantly female characters.

is displayed, which has the general characters of an enlarged clitoris or of a penis. It is imperforate at the normal meatal site (Figure IV) and is invested by a loose tissue of a preputial type. The distal end of this organ depends and obscures a circular median opening, five millimetres in diameter. The distance from the inferior margin of the opening to the superior margin of the anus is 10 millimetres. No traces of *labia minora* can be seen. Palpation of the labia and the inguinal regions fails to disclose the presence of gonads.



FIGURE IV.  
The labio-scrotal folds have been separated and the genital organ has been raised in order to display the position of the median orifice. The distance of the latter from the anus should be observed.

The mammae are prominent. The heart lies on the left side and its sounds are normal.

The baby sucks well, cries vigorously, passes normal motions, and reacts to bright light and sounds. The reaction to light is of special interest, and consists of a tight wrinkling of the skin overlying the eyeball.

Doubts concerning the source of micturition were dispelled by a close examination, a full stream being emitted from the opening concealed by the genital organ.

#### Special Examinations.

**Radiographic Examination.**—The report on the radiographs is as follows:

1. Skull and spine. Normal in shape. All sutures are well developed; if anything, the sutures are slightly wider than usual. The orbits look normal in size and shape. It is too early to determine the presence of *spina bifida*.

2. Skeleton. The clavicles are normal. There is no bony syndactyly of the hands or of the feet. The terminal phalanges of the big toes are ill-formed, especially at the distal ends, and in the case of the right foot the distal phalanges are unusually big.

**Operative Examination.**—With the baby under ether anaesthesia, one of us (G.W.) endeavoured to investigate the condition of the right eyeball. The skin was incised over the eyeball for some two centimetres. Palpation led to the belief that overlying the globe there might be some mucous membrane or a conjunctival sac; these, however,



FIGURE V.  
On the right side a horizontal exploratory incision has been made, and the healed scar can be seen.

were not found. There was loose areolar tissue beneath the skin; the latter was dissected back and a very thick-walled globular cystic sac was disclosed—the eyeball. It was about one centimetre in diameter and had no differentiation of tissue which could be considered corneal. The corneal site was the thickness of a sheet of tissue paper and about as translucent. The cyst was tense, and it could be followed back in the orbit as a pyriform shape, ending in a strand which would represent the optic nerve. When a torch was flashed on the globe a translucency could be seen, any scleral element being very thin. It is remarkable that the flashing of a torch on the skin overlying the eyeball, prior to operation, produced some reflex action. So delicate and thin was the shell of the globe that it was very little handled lest it should rupture. There were some indications of muscular attachments on the globe; but nothing definite was worked out about them. When it was beyond doubt that there was no seeing organ in the orbit and that no purpose could be

achieved in attempting to form a palpebral fissure, the skin incision was sutured (Figure V).

#### The Literature.

It was not possible to examine the whole of the world literature in Australia, because most of the papers were unavailable. When Treacher Collins<sup>(2)</sup> summarized the knowledge of cryptophthalmos in 1900, he knew of only two cases in man and one in a chick. According to Collins, Zehender was the first to apply the term, when he described an example the histopathology of which was investigated by Manz. The findings comprised the following: imperfect lens, imperfect filling of the anterior chamber, normal nerve, retina and pigment. Collins himself observed the condition in a chick.

In 1904 Ballantyne<sup>(3)</sup> listed six cases in man and three in animals; those in man were reported by Chiari, Coen, Fuchs, Karman, Otto and Zehender; those in animals were reported by Bach, Van Duyse and Grandmont. Coover<sup>(4)</sup> increased the total to eleven by reporting two cases in 1910. Coover's cases were of exceptional interest, because they occurred in a mother and her daughter, and because the abnormality was bilateral in each instance. The mother and daughter were normal in every other way. An interesting sidelight was that the father of the child had lost his eyes in an explosion five years before the child was born.

In the *Index Catalogue of the Library of the Surgeon General's Office of the United States Army*, Third Series, Volume V, 1925, at page 467, cases of cryptophthalmos will be found reported by the following authors: Chatton Blanc, Clark, Coover (two cases), Van Duyse, Eberhardt, Ginestous (two cases), Ginzburg, Goldberg, Goldzieher, Golowin, von Hippel, Key, Santos Fernández, Seefelder, Sinclair and Wintersteiner.

Other authors who have reported cases are the following: Avizonis,<sup>1</sup> Böhler<sup>(4)</sup> (in a dog), Chou,<sup>(4)</sup> Collins<sup>(2)</sup> (in a chick), Elliot,<sup>(5)</sup> Hocquart,<sup>(6)</sup> Newman<sup>(7)</sup> and Nichelatti.<sup>1</sup>

Out of all the cases which can be traced, 30 in man, five in animals, the following brief notes are brought forward.

**Newman's Case.**—The child was a male, a Hindoo, one year old, with bilateral cryptophthalmos. He had poorly developed eyebrows, but no trace of a palpebral fissure. The mother stated that the child could distinguish between light and dark; she also said that tears ran down the nose when the child cried.

**Elliot's Case.**—The child was a male, a Hindoo, five months old. He had cryptophthalmos on the right side, partial albinism on the other side. In the former a faint pigmented horizontal line indicates the line of division of the upper and lower eyelids. There are no eyelashes. On the left side the palpebral fissure is half an inch long. The lower eyelid is well formed. Eyelashes and punctum are present. The upper eyelid is not distinctly demarcated. Tears flow into the eye when the child cries. The body is well formed.

**Clark's Case.**—The child is a female Mohammedan, six months old. Both eyeballs are completely covered by skin. No eyelashes are present. Syndactylism of the fingers is present.

**Sinclair's Case.**—The child is a white male, twenty-one months old. He has unilateral cryptophthalmos. There are no eyebrows, eyelashes or palpebral fissure. No other malformation is present.

#### General Discussion.

Points to be discussed may be grouped under the headings of genetics, embryology and treatment.

Treatment consists of an exploratory operation; invariably an imperfectly developed eye has been revealed. The temptation to lift the lid of this Pandora's box is irresistible; unfortunately even hope flies out when the covering is raised. In our case the findings were so discouraging that no disturbance was contemplated on the less favourable side.

In this contribution only a brief mention is warranted of genetic aspects. Crew<sup>(8)</sup> has classified cryptophthalmos as a recessive character, this conclusion being based on mathematical data. Little<sup>(9)</sup> and Bagg made an interesting contribution to a theory which hopes to correlate abnormalities of the eye and the feet. They noticed that abnormalities of the eye and feet occurred in mice among descendants of certain animals (non-pregnant females and males) which were treated with light doses of X rays to the whole of the body. Collins, when discussing his own experience of cryptophthalmos, referred to the breeding of the chicken thus affected. The mother and father of the chick were daughter and father. Other progeny of this cock showed beak and leg abnormalities. At present insufficient data exist to adduce a special relationship between cryptophthalmos, syndactylism and abnormalities of the genitalia.

Finally, the following embryological points are made. The neural elements of the eye develop from the forebrain vesicle, and are derived from neural ectoderm. In cryptophthalmos, and especially in our illustrative case, the initial stages have been orderly, as judged from the presence of a light reflex, indicative of differentiation of photosensitive epithelium in the retinal layer. Disorder has occurred in the subsequent stages of organization, when lens, iris, cornea, conjunctiva and eyelids arising from skin ectoderm have become dependent for their differentiation on organizers which have failed to exert their influence. Fœtal inflammation is no longer acceptable as an explanation of the condition.

Is hermaphroditism, true or false, present? This problem arises when an attempt is made to conjecture the sex of the baby.

Labio-scrotal folds (that is, undifferentiated labia or scrotum, in the embryological sense) are rugose and of the nature of a bifid scrotum, notwithstanding the absence of testes from their depths and from the inguinal regions. Furthermore, there are no *labia minora*. The phallic organ, despite the absence of a meatal orifice at the tip, is a penis rather than a clitoris, even though it has failed to surmount the bifid scrotum. The circular opening in the mid-line represents a perineal hypospadias, implying a failure of fusion of the urethral folds.

<sup>1</sup> These two reports have not been actually seen; they were found in the *Quarterly Cumulative Index Medicus*, Number 3, 1928, and Number 5, 1929, respectively.



Urine is emitted forcibly from this orifice in a stream of wide calibre; thus the orifice cannot be considered a vagina, of which there is no other external evidence. This conclusion also receives important support from the relatively great distance intervening between the orifice and the anus.

In an attempt to avoid the error of misdiagnosis of the sex, it must be borne in mind that the tendency is to designate males as females rather than the reverse. The ultimate criteria of sex cannot be established in the absence of information of the type and histology of the gonads, and for the same reason a classification of the genitalia into the sub-groups of hermaphroditism is impossible.

Novak's<sup>(10)</sup> observation that typically female external genitalia have been found in individuals in whom the gonads, and perhaps the only gonads, were testes, adds an extra complication.

Hence a final assignment of sex to the baby cannot be made, although the special appearances give presumptive evidence of maleness. And should the baby continue to live, the determination of sex may finally rest, not upon non-functional gonads alone, but on the obvious predominant dictum of Blair Bell.<sup>(11)</sup>

The child is alive and thriving at this date (April 12, 1940).

#### Summary.

1. The characters and literature of ablepharia or cryptophthalmos have been discussed.

2. An illustrative case, reported for the first time, has been presented, in which bilateral ablepharia associated with syndactyly of the hands and feet and malformation of the external genitalia are features.

#### Acknowledgements.

The authors offer their thanks to Dr. Gordon Robertson, who was in charge of the patients, for his whole-hearted cooperation; to Dr. H. R. Sear for the radiographic reports; and to Dr. Sharland (Royal Prince Alfred Hospital) for arranging for the radiographs. Mr. S. Woodward Smith, of the Department of Medical Artistry, University of Sydney, is responsible for the splendid photographs, for which Professor Lambie arranged.

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## Reports of Cases.

### THROMBOCYTOPENIC PURPURA TREATED BY SPLENECTOMY AND COMPLICATED BY INFECTIOUS MONONUCLEOSIS.

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THE operation of splenectomy in the treatment of thrombocytopenic purpura has attracted much attention in recent years, and the literature contains many reports of patients treated in this manner. Kaznelson (1916) was the first to carry out this form of treatment, his reasoning being that the hæmorrhages were caused by a reduction in the number of platelets, owing to the destructive action of a diseased spleen. At about the same period, Frank (1915-1917) also recommended splenectomy. He suggested, however, that the reduction in the platelet count in this disease was due rather to an inhibitory action of the spleen on the bone marrow than to an actual destruction of platelets by the spleen. This view has recently been revived by the work of Torrioli and Pudder (1938), Troland and Lee (1938) and Hobson and Witts (1940) on the preparation of platelet-reducing extracts from the spleen. Troland and Lee call the active substance "thrombocytopen", but the findings of these authors could not be confirmed by Pohle and Meyer (1939).

Twelve years ago Spence (1928) summarized the results of splenectomy in all the case reports published before that date, and showed that the disease might be classified into two types: (i) acute, in which the final results of splenectomy were not good, and in which both the operative mortality rate and the mortality rate without operation were high; (ii) chronic, in which the operation produced a much more favourable result. In the series of 101 cases classified in this manner he found that good results, considered as cure, or at least as non-recurrence, were obtained in 80% of chronic cases, but in only 16% of acute cases.

The following case is deemed worthy of recording, partly because of the very rapid return to normal of the blood picture after splenectomy and partly on account of the complication of the period of convalescence by the onset of an atypical form of infectious mononucleosis.

#### Clinical Record.

D.W., a woman, aged twenty years, was admitted to the Royal Prince Alfred Hospital on July 30, 1939, in a stuporose state. The history of the present illness, as obtained from the husband, and later confirmed by the patient, dated from July, 1938, when she had strained her left ankle, the injury resulting in considerable swelling and bruising. The local condition was treated along the usual lines and eventually subsided. Ever since this injury, however, she had been bruised readily by the slightest trauma and had had frequent epistaxes. Her menstrual periods had been normal and regular until May, 1939, when her period commenced two days late and was prolonged for nearly two weeks. The period following this one had been continuous and fairly profuse for three weeks.

On about July 10, 1939, the patient noticed a severe pain in the right lumbar region, and she attended a hospital, where she was told that she was bleeding from a kidney.

On July 24, 1939, severe frontal headache developed, which was not relieved by phenacetin and acetylsalicylic acid. On July 30, 1939, the headache became very much worse and was accompanied by occasional vomiting. Her consciousness gradually became dulled and she was brought to hospital and admitted.

She had never suffered from hæmoptysis, hæmatemesis, melena nor frank hæmaturia, and previous to the present illness she had always been in perfect health. There was no family history of bleeding diseases nor of any other relevant illnesses.

Examination revealed a thin, very pale young woman, lying curled up in bed in an attitude of general flexion. She was in a stuporose condition, but responded to painful stimuli. At the same time she exhibited pronounced restlessness and she was apparently able to move her limbs freely. The skin was pale, cool and dry.

Irregular bruised areas were found on the right forearm, on the left side of the chest, in both popliteal spaces, and on the dorsum of the left foot, while scattered purpuric spots were visible on the abdomen. There was a small amount of bleeding from the nose, but none from the gums. The capillary resistance test revealed no abnormality. The tongue was moist and furred. The spleen, liver and kidneys were not palpable and the uterus was not enlarged.

The pulse rate was 80 beats per minute, and the beats were regular in time and amplitude. There were no abnormal physical signs referable to the heart and lungs.

The pupils were equal, central, circular, and moderate in size; they reacted briskly to light. The patient exhibited some photophobia. No wasting was detected in the peripheral musculature. Neither head retraction nor neck rigidity was present and Kernig's sign was not elicited. The elbow reflexes, supinator reflexes and knee jerks were exaggerated; the ankle jerks were normal and no patellar or ankle clonus was elicited. The response to the plantar reflex was normal flexor in type in the right foot, but extensor in type in the left foot. There was no incontinence of urine nor of faeces.

The urine, obtained by catheterization, had a specific gravity of 1020, and contained a moderate amount of albumin and blood.

Lumbar puncture, carried out shortly after the patient's admission to hospital, revealed that the cerebro-spinal fluid pressure was 280 millimetres of water. The first few millilitres of the fluid withdrawn were of a pinkish colour, the remainder being pale greenish-yellow in colour, and obviously turbid. No organisms were grown on attempted culture from the fluid.

On the next day, July 31, 1939, the patient was a little more responsive. Examination of the blood revealed 2,310,000 erythrocytes per cubic millimetre, a hæmoglobin value of 6.5 grammes per 100 millilitres, and a colour index of 0.9. There was a moderate degree of anisocytosis, poikilocytosis and polychromasia. The leucocytes numbered 10,500 per cubic millimetre; the differential count showed that 90% were neutrophile cells, 6% were lymphocytes and 4% were monocytes. The platelets numbered 90,000 per cubic millimetre. The bleeding time was sixteen minutes (normal, one and a half to three and a half) and the coagulation time was twelve and a half minutes (normal, eleven).

The patient's blood having been typed, a blood transfusion of one pint was given. The next day the number of erythrocytes had risen to 3,240,000 per cubic millimetre, while the hæmoglobin value was 8.4 grammes per 100 millilitres. The leucocytes numbered 11,300 per cubic millimetre; the differential count showed that 81% were neutrophile cells, 13% were lymphocytes, 5% were monocytes and 1% were eosinophile cells. The platelets numbered 125,000 per cubic millimetre, the bleeding time was six and a half minutes, and the coagulation time was eight minutes.

On August 2, 1939, the patient was conscious, but a little drowsy. She was unable to speak, and when she attempted to write something it was discovered that she had a paresis of the right arm and the right side of her face. On August 3, 1939, she was given a second blood transfusion, and further transfusions were given on August 5, 1939, and August 8, 1939. In the meantime her condition rapidly improved and she became quite cheerful. By August 5, 1939, the paresis had practically disappeared from her face, but she still had some weakness of the right hand. The blood transfusions now became

increasingly difficult, owing to thrombosis of the veins in the antecubital fossæ, and to severe bruising of the surrounding tissues. During the last transfusion a shivering attack occurred, and it was considered unwise to continue transfusions for a time.

On August 9, 1939, the erythrocytes numbered 3,260,000 per cubic millimetre, the hæmoglobin value was 8.9 grammes per 100 millilitres, the platelets numbered 110,000 per cubic millimetre, the bleeding time was eight minutes, and the coagulation time was eleven minutes. On August 12, 1939, the number of platelets had risen to 150,000 per cubic millimetre and the bleeding time had fallen to four and a half minutes; otherwise the blood picture was unaltered. Prior to this time the question of splenectomy had been considered; but it was decided to defer the operation until the patient's condition became more satisfactory and the blood picture had been brought nearer to normal by repeated blood transfusions. Until August 14, 1939, repeated examination of her abdomen had failed to reveal any enlargement of the spleen; but on this date for the first time this organ could be palpated at about one inch below the costal margin.

On August 16, 1939, the spleen was removed by Dr. J. C. Storey. At operation this organ was found to be fairly freely mobile, and on delivery from the wound it was seen to be enlarged to about three or four times its normal size. Unfortunately, a small amount of blood was lost from the spleen before it was fixed, with the result that it shrank considerably. Microscopic examination revealed that there was considerable engorgement of the splenic sinuses, which were packed with erythrocytes; the tissue between them was in parts somewhat condensed and fibrous; the Malpighian bodies were large.

A blood examination was carried out two hours before the operation and again one hour afterwards, with the results shown in Table I.

From the surgical point of view the convalescence was uneventful, with very little post-operative reaction. The wound healed well, and the sutures were removed on the fifteenth day. The epistaxis and menorrhagia, which had been persistent, ceased within a few days after operation. The subsequent course of the blood changes is shown in Table I and the graph (Figure I).

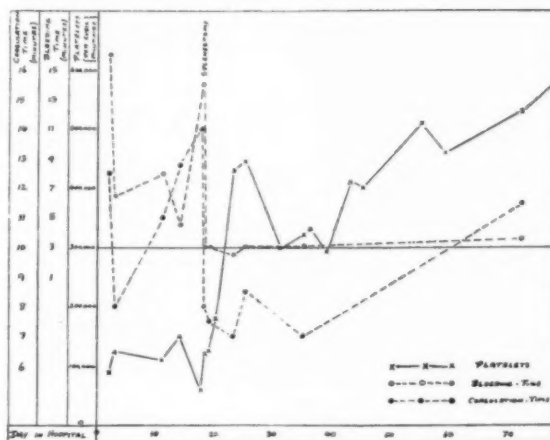


FIGURE I.

Graph showing the changes in the platelet count, bleeding time and coagulation time in the blood of Mrs. D.W. before and after splenectomy.

On September 2, 1939, the patient complained of a sore throat and pain at the back of the neck, together with general malaise. The temperature suddenly rose to 102° F. and the pulse rate to 120 beats per minute, and over the next few days the temperature became remittent in type.

TABLE I.  
Showing the Variations in the Principal Elements of the Blood Picture of Mrs. D.W.

Date.	Red Cells per Cubic Millimetre. (Millions.)	Hæmoglobin Value. (Grammes per 100 Millilitres.)	Total White Cells per Cubic Millimetre.	Neutrophile Cells per centum.	Lymphocytes per centum.	Monocytes per centum.	Platelets per Cubic Millimetre.	Bleeding Time. (Minutes.)	Coagulation Time. (Minutes.)	Remarks.
31/7/39	2.31	6.5	10,500	90.0	6.0	4.0	90,000	16.0	12.5	Four blood transfusions: 31/7/39, 3/8/39, 5/8/39, 8/8/39. Two hours before splenectomy.
1/8/39	3.24	8.4	11,300	81.0	13.0	5.0	125,000	6.5	8.0	
9/8/39	3.26	8.9	—	—	—	—	110,000	8.0	11.0	
12/8/39	3.32	8.8	—	—	—	—	150,000	4.5	13.0	
16/8/39	3.44	9.3	—	—	—	—	60,000	14.0	14.0	
(before splenectomy)	—	—	—	—	—	—	—	—	—	
16/8/39 (after splenectomy)	—	8.8	—	—	—	—	120,000	3.0	8.0	One hour after splenectomy.
17/8/39	3.37	8.6	31,700	91.0	3.5	5.5	125,000	3.0	7.5	17% stippled red cells.
18/8/39	—	—	—	—	—	—	180,000	—	—	15.5% unclassified mononuclear cells. 21.5% unclassified mononuclear cells.
21/8/39	2.60	6.0	7,700	74.5	11.0	11.0	430,000	2.5	7.0	
23/8/39	—	—	—	—	—	—	445,000	3.0	8.5	
29/8/39	—	—	—	—	—	—	320,000	3.0	7.0	
4/9/39	3.79	8.8	6,900	49.5	35.0	7.5	330,000	—	—	
7/9/39	—	—	8,900	60.5	34.5	3.0	295,000	—	—	
11/9/39	—	—	10,200	52.0	25.0	3.5	410,000	—	—	
13/9/39	—	—	17,200	45.5	28.5	3.5	400,000	—	—	Discharged 1/10/39. Still moderate anisocytosis and poikilocytosis.
23/9/39	3.81	9.6	15,950	18.0	74.0	6.0	510,000	—	—	
27/9/39	4.24	10.3	12,150	30.0	53.0	12.0	460,000	—	—	
9/10/39	3.88	9.0	8,250	40.0	50.0	7.5	550,000	3.5	11.5	Discharged 1/10/39. Still moderate anisocytosis and poikilocytosis.
30/10/39	4.37	9.5	7,800	39.5	44.0	12.5	630,000	—	—	
27/11/39	4.66	11.1	8,400	63.0	25.0	10.0	780,000	—	—	

On September 4, 1939, a blood count gave the following results: the erythrocytes numbered 3,790,000 per cubic millimetre, the hæmoglobin value was 8.8 grammes per 100 millilitres, the colour index was 0.81, and the platelets numbered 330,000 per cubic millimetre; the leucocytes numbered 6,900 per cubic millimetre, 49% being neutrophile cells, 35% lymphocytes, 7.5% monocytes, 4.5% eosinophile cells and 3.5% basophile cells. Neutropenia and a relative lymphocytosis were therefore present.

On the next day the patient felt less ill and she was eating and sleeping better; but her temperature remained elevated, swinging between 99° F. and 103° F. Three days later, on September 8, 1939, several enlarged and slightly tender lymphatic glands were discovered in the neck, axillæ and groins, while the remittent pyrexia remained unabated.

On September 11, 1939, the patient's general condition was the same, but the blood picture showed an interesting change. A slight leucocytosis was now present, with a considerable percentage of unclassifiable cells, apparently of the monocyte series. The blood count revealed that the platelets numbered 410,000 per cubic millimetre and the total leucocytes 10,200 per cubic millimetre; of these, 52% were neutrophile cells, 25% were lymphocytes, 3.5% were monocytes, 2% were eosinophile cells, 2% were basophile cells, and 15.5% were unclassifiable mononuclear cells. A curious feature of the blood picture was the very large size of the platelets, some of which were about one-quarter the size of an erythrocyte, and many of them were crescent-shaped. The erythrocytes were also increased in size at this period and showed pronounced polychromasia.

The Paul-Bunnell test, which consists of the agglutination of sheep's red cells by the patient's serum, was without result. No organisms were grown from the blood on attempted culture. The agglutination reaction was "negative" in all dilutions against *Bacillus typhosus* O, *Bacillus typhosus* H, *Bacillus paratyphosus* A and B, *Bacillus proteus* (Kingsbury), *Bacillus proteus* (Warsaw) and *Brucella abortus* (human).

The temperature remained of the remittent type, swinging between 103° and 104° F. and 99° and 100° F.

for a further seven days; on September 13, 1939, the leucocytes numbered 17,200 per cubic millimetre, 45.5% being neutrophile cells, 28.5% lymphocytes, 3.5% monocytes and 21.5% unclassifiable mononuclear cells.

On September 19, 1939, the maximum temperature was only 100° F. and the patient was feeling very much better; but it was noticed that she had some slight swelling of the feet, especially on hanging them down.

On September 23, 1939, the temperature remained under 99° F., and a blood count now gave the following results: the erythrocytes numbered 3,810,000 per cubic millimetre, with occasional stippled cells; the hæmoglobin value was 9.6 grammes per 100 millilitres; the colour index was 0.88; the platelets numbered 510,000 per cubic millimetre. The leucocytes numbered 15,950 per cubic millimetre; only 18% were neutrophile cells, 74% were lymphocytes, 6% were monocytes, 1% were eosinophile cells and 1% were basophile cells. Therefore pronounced neutropenia and relative lymphocytosis were present.

On September 25, 1939, the patient felt very well and cheerful, and she was allowed to sit in a chair in the sun, the temperature still being normal; and on October 1, 1939, forty-six days after splenectomy, she was discharged from hospital, apparently cured. Subsequent follow-up blood counts revealed that (a) a moderate microcytic anaemia persisted, (b) the number of platelets remained very high (700,000 to 800,000 per cubic millimetre), and (c), as is usual after infectious mononucleosis, the lymphocyte picture slowly returned to normal.

#### Discussion.

##### Diagnosis.

In the purpuric stage the differential diagnosis is from hæmophilia, splenic anaemia, acholuric jaundice, the leuchæmias and infective endocarditis. These are all readily eliminated by a consideration of the points in the history and by the full examination of the blood.

The mononucleosis is more difficult to explain and the diagnosis is arrived at only by the successive elimination of various forms of pyrexia associated with enlargement of the cervical lymph nodes. Nevertheless, on the evidence available, the diagnosis of infectious mononucleosis seems



the most probable, in spite of the absence of response to the Paul-Bunnell test.

#### *The Platelets and Splenectomy.*

The number of platelets before operation was not excessively low, and many cases have been reported in which these have been reduced to 10,000 per cubic millimetre or lower, with subsequent recovery after splenectomy.

Duke (1912) stated that a diminution in the platelet count was associated with prolongation of the bleeding time, though the actual clotting time remained normal; and later Sutherland and Williamson (1925) showed that when the platelets reappeared in sufficient numbers in the blood stream, as after splenectomy, the bleeding time tended to return to normal. These statements would appear to be applicable to this case, and particularly noteworthy is the great rapidity with which these factors reached the normal figures after splenectomy. In the blood examination made one hour after the conclusion of the operation the bleeding time had already fallen to normal and remained normal subsequently, while the platelets must have passed the accepted normal figure of 300,000 per cubic millimetre within three or four days and later rose more slowly to more than double that figure. It is regrettable that even more frequent estimations of the number of platelets were not made.

#### *The Mononucleosis.*

Tidy classified infectious mononucleosis into three types: (a) glandular, (b) anginose and (c) febrile; and this case is not typical of any of these forms. The atypical features may possibly be accounted for by the absence of the spleen. In a survey of the literature I have been unable to find any comparable case in which infectious mononucleosis occurred in a patient who lacked a spleen, and considerably more evidence would be required before attempting to discuss this question.

#### *The Pareses.*

A small but important point to note is the transient nature of the neurological signs. On the patient's admission to hospital the physical signs and the findings after lumbar puncture pointed to some form of intracranial hæmorrhage. Then three days later a paresis of the right side of her face and right arm developed, together with a motor aphasia. In a further three days the facial paresis had practically disappeared, while the paresis of the right hand and the aphasia persisted for about a week.

These signs were probably caused by capillary hæmorrhage—internal capsular, cortical or possibly subarachnoid in situation—involving the pyramidal system on the left side of the brain. The unusually rapid disappearance of the paresis as compared with the customary period of weeks or even months as seen in the vascular accidents associated with arteriosclerosis and like lesions is noteworthy.

#### *Acknowledgements.*

I wish to acknowledge the valuable assistance given me by Professor C. G. Lambie and by the pathological department of the Royal Prince Alfred Hospital.

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#### *FACIAL HEMIATROPHY.*

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As facial hemiatrophy (or the Parry-Romberg syndrome) is so seldom encountered, it may lead to possible errors in diagnosis and unwarranted investigations and treatment. I am therefore reporting briefly the details of a classical case which recently came before me. The history as detailed was as follows.

The patient, a boy of fifteen years, was a perfectly healthy baby and infant, and suffered from no illness until the age of ten years. In December, 1935, he was operated upon for acute appendicitis, and following the operation the parents noticed an "uneven facial development". The first site of the wasting was the right cheek,



FIGURE 1.

Note the submalar hollow of the right cheek.

just below the malar bone, and at this stage there was a falling out of the hair of the scalp over the right temporal area. The atrophy spread further with a gradual diminution in bulk of the whole of the right side of the face. This includes the right half of the lower jaw and cartilage of the nose, and even the right eye was slightly lessened in size. There is an unsightly hollow in the right cheek, and the right pinna is slightly decreased in size. The tongue protrudes in the mid-line, but the obvious hemiatrophy was noticed neither by the parents nor by

the patient until it was pointed out at the time of the examination. There is a central vertical furrow on the forehead extending from the base of the nose to the hair line. Thus the face appears to be made up of two unequal and dissimilar parts. There is no loss of sensibility, even though all layers of the skin are atrophied so that



FIGURE II.

Note the central furrow on the forehead and the normal contour of the left half of the face.

it has a characteristic withered parchment-like appearance. Apart from the unsightly facial appearance the boy suffers no ill effects.

The diseases with which the condition may be confused are: (a) atrophy from acute poliomyelitis, (b) syringo-



FIGURE III.

Note the complete asymmetry of the face.

myelia commencing as a facial hemiatrophy, (c) localized scleroderma, (d) congenital torticollis with asymmetry.

However, if the following features are present there can be no difficulty in formulating the correct diagnosis. They may be summarized precisely as follows: (i) The condition is strictly unilateral. (ii) The onset is insidious and is often preceded by a slight injury, infection, or an

apparently unrelated operation. (iii) The wasting involves skin, fat, subcutaneous tissues and even muscles; but the muscles do not lose their power nor cease their functions. (iv) Retarded growth of bone and cartilage occurs. (v) The tongue shows hemiatrophy and is protruded in the mid-line. (vi) No sensory or electrical changes are present. (vii) The course is progressive to a certain stage and then the condition becomes stationary. (viii) There are no ill effects on the life of the patient. All the characteristics will be noticed if reference is made to the accompanying illustrations.

In this particular case my view is that the atrophy is now self-limited, as during the past twelve months there has been no further deformity and the alveolar margin shows some slight evidence of regeneration.

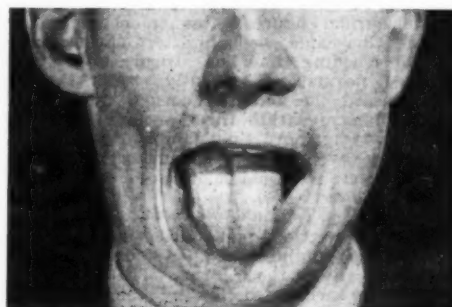


FIGURE IV.

Note the hemiatrophy and mid-line protrusion of the tongue.

No explanation of the condition is known; but the suggestion that it is due to peripheral or pontine (nuclear) disease of the fifth nerve is the most tenable. The atrophy may be distributed over the whole area of the supply of the trigeminal nerve, or, as is more usual, may be confined to one or more of its branches. The above is an example of the involvement of the whole three branches, but the main incidence is over the superior maxillary branch of the fifth nerve.

It is worthy of note, however, that the disease may appear without any exciting cause, but often is preceded by some injury of not very serious nature, such as a blow on the face, fracture following dental extraction and other surgical procedure.



FIGURE V.

Note the wasting of the skin and the increased wrinkling.

No treatment is of any avail. The procedure of injecting paraffin under the skin to replace the fat and so fill the unsightly malar hollow has been discarded owing to its instability from gravitational flow.

Before concluding I should like to record indebtedness to Dr. G. Mason for the photographs.

## Reviews.

### THE BACTERIOLOGY OF MILK.

THE need for the inclusion of results of recent research in dairy bacteriology has prompted Mr. C. H. Chalmers to publish a second edition of his book on "Bacteria in Relation to the Milk Supply".<sup>1</sup> While this book retains its original form, its scope has been enlarged, and most of the information necessary for the routine bacteriological analyses of milk is to be found between its covers.

As with the previous edition, there are two parts, the first dealing with the routine examination of milk and water, taints and abnormal conditions in milk, the isolation and identification of organisms from milk and the control of the dairy plant, the second part being devoted to general bacteriological technique. Four appendices are included, dealing with the composition of culture media, the composition of stains and chemical reagents, the microscope, and bacteriological standards for graded milk respectively.

Some attempt has been made to supply a concise section on determinative bacteriology, with reference to those forms likely to occur in milk. This is of doubtful value, especially with regard to the part dealing with the pathogenic organisms, and it would in no way detract from the value of the book if these sections were omitted and the reader was referred to standard works on bacteriology.

It is pleasing to note that a number of questionable statements and some misprints which appeared in the first edition have been amended.

This work can be confidently recommended not only to those who are entrusted with the bacteriological examination of milk, and to students and technicians associated with the dairying industry, but to all who are interested in the laboratory control of milk supplies.

### INFECTIONS OF THE HAND.

FIFIELD'S "Infections of the Hand" fills a real need, for the subject is not well dealt with in most text-books.<sup>2</sup> The manuals of anatomy do not give an adequate description of the anatomy of the hand from the surgeon's point of view, and the smaller surgical text-books are dangerously incomplete, while Kanavel's classical work is rather lengthy for the average student in his crowded course. There is perhaps no other part of the body where such an exact knowledge of so much detailed anatomy is necessary, nor where so much care and skill in diagnosis and treatment must be employed if good functional results are to be obtained.

Fifield's little book is concise and complete. It opens with a most excellent description of the anatomy of the hand, and subsequent chapters take the several types of infection in turn and deal fully and clearly with each. The book is up to date, easy to read, and the orderly fashion in which each subject is set out is an aid to memory and makes reference rapid and simple. The book is well illustrated, with a happy combination of good clear plates and simple diagrams.

Immediate treatment and early after-treatment are fully described and thoroughly sound throughout, and the many adjuvant measures which may be used are discussed fully and wisely. Restoration of function is, however, dealt with in one paragraph. This is admittedly a difficult subject to tackle, since each case presents an individual problem; yet this is just the point in practice where treatment is

apt to break down. A few illustrated pages devoted to splints and reeducative apparatus with a fuller description of suitable exercises and occupational therapy would be most useful, and it is hoped that these will be included in the next edition. There is a very good last chapter on insurance aspects and prognosis.

This is a fine little book and should be read by every medical student. Moreover, containing as it does in brief space a detailed account of diagnosis and treatment, it is just the book needed for reference by the practitioner. It can hardly be too highly recommended.

### VIRUS AND RICKETTSIAL DISEASES.

THERE is no need to emphasize the importance of the viruses. They cause at least thirty-five diseases of man, including such important diseases as smallpox, poliomyelitis, yellow fever, as well as several hundred diseases of animals and plants. Harvard University is fortunate in having a considerable group engaged in the study of virus diseases, and in June, 1939, these held a symposium. The rickettsial diseases were included because of their close relationship. Twenty-two authors contributed thirty-four papers, and these have now been published under the title of "Virus and Rickettsial Diseases". The volume, which gives a survey of the present state of virus knowledge, is welcome, for information has been rapidly accumulating and new techniques have been developed.

The book opens with four general chapters and then individual viruses are dealt with in turn. The emphasis is on human disease, but plant and animal viruses are frequently mentioned and some are treated fully. Gordon discusses epidemiological problems, and Simmons insect vectors. Mueller describes the physical and chemical properties of viruses and puts forward a plausible surmise as to their nature, which may be summarized as follows. A bacterial cell must contain, as well as the vital controlling nucleoprotein, numerous enzymes for synthesis and energy production. There is room in a small bacterium for a million such molecules. In a favourable environment certain enzymes are unnecessary and may be discarded, with a corresponding reduction in size of the organism. The various viruses graded from the largest to the smallest represent progressive deletions of enzymes, till finally the smallest may consist of only a molecule of nucleoprotein—almost the sole remaining function being that of multiplication.

Immunology of virus infections is discussed by Zinsser. Active immunization against virus diseases by the use of attenuated strains has already made considerable progress, as, for instance, in smallpox and yellow fever. Burnet's work is mentioned as providing a hope that influenza may eventually be prevented by inoculation of a non-pathogenic strain. With killed viruses early attempts to produce immunity failed; but more recent attempts with the greater amounts that tissue culture allows are promising, as with equine encephalomyelitis. Serum therapy of virus diseases is not hopeful, though the use of convalescent serum in aborting an attack of measles or mumps is well established.

Russell discusses the epidemiology and control of smallpox, and makes the interesting suggestion that the lifelong immunity that follows an attack of certain virus diseases, such as smallpox, is due to the persistence of a small focus of infection. Robinson describes the preparation and use of vaccinia. Vaccines prepared in both tissue culture and developing egg are in use; but he considers that, though these vaccines have certain advantages, they should not replace calf vaccine until their efficacy and freedom from complications have been tested on much larger series. The occasional complications of vaccination—generalized vaccinia and vaccinia encephalitis—are fully discussed by Ross and Eley.

<sup>1</sup>"Bacteria in Relation to the Milk Supply: A Practical Guide for the Commercial Bacteriologist", by C. H. Chalmers, B.Sc., N.D.A.; Second Edition; 1939. London: Edward Arnold and Company. Crown 8vo, pp. 221. Price: 6s. net.

<sup>2</sup>"Infections of the Hand", by L. R. Fifield, F.R.C.S.; Second Edition, by P. Clarkson, F.R.C.S.; 1939. London: H. K. Lewis and Company Limited. Crown 8vo, pp. 180, with 57 illustrations, including 8 plates. Price: 9s. net.

<sup>3</sup>"Virus and Rickettsial Diseases, with Especial Consideration of their Public Health Significance. A Symposium held at the Harvard School of Public Health, June 12-June 17, 1939". Cambridge (Massachusetts): Harvard University Press. Medium 8vo, pp. 916, with 28 illustrations. Price: \$6.50 net.



Enders reviews the attempts to infect laboratory animals with measles, concluding that transmission has never been proved except with monkeys. McKhann devotes a chapter to the public health importance of measles and to the methods of prevention, including the use of immune serum or placental extract in preventing or modifying an attack. A paper on the reporting of measles did not deserve inclusion. Wesselhoft, in his interesting account of mumps, pays special attention to the encephalitis which frequently occurs. Clinical signs of encephalitis can be found, if looked for, in almost 10% of adult cases of mumps. In other cases the encephalitis is symptomless, being manifested by a pleocytosis in the cerebro-spinal fluid. Convalescent serum is effective in preventing an exposed child from developing mumps; but the immunity is short-lived, and practically it is better to let the child get his attack over while young.

Simmons writes on dengue, mainly on the basis of his thorough investigations in Manila, where he used soldier volunteers freely. Research in dengue, as in measles, has been greatly hampered by the absence of a convenient animal for experimental purposes. Nelson briefly reviews *lymphogranuloma inguinale*. Drinker describes experiments on the absorption of toxic and infectious material from the respiratory tract. The review of the respiratory viruses, with special reference to human and swine influenza, is notable chiefly for its unnecessary length. No doubt it contains much good material—264 references are quoted—but it should have been blue-pencilled to half the length. Distemper, concisely presented by Nelson, is an encouraging study, for an efficient method of immunization has been evolved. First an injection of formalized dog spleen vaccine is given and then an injection of live virus. Enders discusses psittacosis well. Sections deal with the virus, the disease in man, parrots and laboratory animals, immunity and epidemiology. The control of psittacosis is a difficult public health problem.

The important subject of poliomyelitis covers three chapters. Aycock writes those on epidemiology and prevention. He concludes that none of the attempted methods of prevention—isolation and quarantine, active immunization, chemical blockade of the upper part of the respiratory system—have been successful in practice. McKhann describes the clinical features and treatment. He does not regard convalescent serum as of value in either the paralytic or preparalytic stages. Fothergill sets out a tentative classification, based largely on that of Hurst, of the viruses that attack the nervous system, ranging from the strictly neurotropic which attack nerve cells only, such as those of poliomyelitis and rabies, to those causing the post-infection encephalitides in which the basic pathological change involves the white matter. He discusses in particular the epidemic types of encephalitis, and also contributes chapters on louping-ill and the very interesting equine encephalomyelitis. Severe epidemics of the latter disease have occurred among horses in the United States of America; and in Massachusetts in 1938 there was a human epidemic with 40 cases. An efficient vaccine for protection of horses has been made by formalinizing an egg culture of the virus. Kelser reviews rabies, referring especially to the indications for treatment, the types of vaccines available and the results of their use. Blackfan writes a useful article on lymphocytic choriomeningitis.

Yellow fever occupies three chapters. Sellards, who has taken an active part in the investigations into yellow fever, writes of its aetiology and of the characteristics of the virus. Russell describes the gradual unfolding of our knowledge of its epidemiology. Gordon's chapter on the preparation and use of yellow fever vaccine is a delight to read because of its clarity and graphic style. Over a million people were vaccinated against yellow fever in Brazil in 1938.

The rickettsioses are discussed in four chapters. Wolbach contributes a general survey, and Pinkerton the diagnosis and classification. Gordon gives forty pages to an excellent account of the clinical features, and Zinsser deals with epidemiology and immunity.

Although a great variety of human rickettsioses have been described, most of them fall into three groups—the typhus group, with its two varieties, classic and murine; mite-borne tsutsugamushi; and the tick-borne spotted fever group. The only human rickettsioses outside these groups are trench fever and the nine-mile fever of Montana, which is practically identical with Australian "Q" fever. Zinsser notes that classic typhus, which is usually epidemic, can be endemic with a low mortality; and that murine typhus, which is called endemic typhus in America, may in louse-infested communities be spread by lice in epidemic manner with a high mortality.

Of great interest is Zinsser's account of attempts at typhus prophylaxis. French workers have, in Morocco and Chile, inoculated a living and (they considered) attenuated strain of murine typhus. Zinsser doubts the attenuation and points out that while living vaccine produces an effective immunity, its use carries two dangers, that of producing frank typhus in a proportion of the vaccinated, and that of starting an epidemic in louse-infested communities. Serovaccination with living virus and antiserum is possible; but it is difficult to adjust the balance of the mixture.

The secret of success in exciting immunity with killed rickettsiae is to use adequate amounts, which in the past have not been easy to provide. With spotted fever Spencer and Parker use the ground-up viscera of infected ticks; with classic typhus Weigl used the intestines of lice infected rectally; for murine typhus Zinsser obtains a heavy suspension of rickettsiae from the peritoneal cavity of rats exposed to heavy doses of X rays before infection. The most recent method of obtaining rickettsiae in quantity—agar tissue culture—may prove the most effective of all. As regards passive immunity, Zinsser's horse serum has been used in Mexico, in both prophylaxis and treatment, with encouraging results.

With two or three exceptions the papers are excellent and the volume can be warmly recommended.

#### DERMATOLOGY.

THE third edition of R. Cranston Low's "The Common Diseases of the Skin" is an excellent example of the lucidity of the teaching of the Edinburgh school.<sup>1</sup> Although written primarily for the student, it will be found to be very sound for the general practitioner.

The portion of the introductory section dealing with the general principles of treatment is exceedingly good. The formulæ suggested for the treatment of the individual dermatoses are simple and relatively few. The advice given never to use *Unguentum Hydrargyri* for the treatment of *pediculi pubis* should be noted by all. The modern occlusive strapping method of treating impetigo is not mentioned, although this method is more rapid and more comfortable than the orthodox ointment methods suggested. Interdigital tinea, of such importance in Australia, is not dealt with at all.

The whole subject of dermatitis is very thoroughly considered and the lines of treatment suggested are sound. Although syphilis is mentioned in the consideration of the differential diagnosis of various dermatoses, there is no section devoted to its consideration. The author mentions in his preface that he advises the student to consult the special text-books on venereal disease for this information. It would seem a pity that a short section including the salient points has not been thought advisable. This lack detracts from the all-round value of the book. The paper is excellent and does justice to the 148 illustrations, which include eight coloured plates. The latter are better than those generally seen in text-books of this size.

<sup>1</sup> "The Common Diseases of the Skin: A Handbook for Students and Medical Practitioners", by R. C. Low, M.D., F.R.C.P.E., F.R.S.E.; Third Edition; 1939. Edinburgh: Oliver and Boyd. Crown 8vo, pp. 333, with 148 illustrations, 8 of which are in colour. Price: 10s. 6d. net.

## The Medical Journal of Australia

SATURDAY, JUNE 29, 1940.

All articles submitted for publication in this journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

References to articles and books should be carefully checked. In a reference the following information should be given without abbreviation: Initials of author, surname of author, full title of article, name of journal, volume, full date (month, day and year), number of the first page of the article. If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance.

Authors who are not accustomed to preparing drawings or photographic prints for reproduction are invited to seek the advice of the Editor.

### MEDICAL RESEARCH AND THE WAR.

THE research promoted and fostered by the Medical Research Council of Great Britain covers such a variety of subjects that the annual report of that body is to all intents and purposes a review of progress in medicine. The report for the year 1938-1939, presented to Parliament in January, 1940, has the scientific interest that we have learned to expect from such documents, but it has an added interest by reason of a discussion on medical research and the war, a discussion as stimulating as it is appropriate to the times in which we are living.

That medical research is considered in Great Britain to be of value is shown by the fact that the grant-in-aid provided by Parliament for the year ended September 30, 1939, was £265,000. This sum incidentally "received important augmentations" from other sources. In previous years it has been made clear that though workers have been allowed to conduct research of their own

choosing, the Medical Research Council has from time to time responded to appeals for help in the solution of special problems as they have arisen in the administration of government departments. This policy has been maintained. Workers have been encouraged to continue their investigations as under normal conditions; but since the outbreak of war some research workers have responded to special calls—"to join the Defence Services, to take part in emergency schemes, or to undertake special investigations suggested by war conditions". While the Medical Research Council has been willing to allow special investigations to be made, it is not blind to a real danger—not the danger of failure to investigate special problems, but the danger that by a switching over to objectives of immediate practical interest the fruits of promising research unrelated to war should be lost. The council intends as far as possible to prevent such losses of important knowledge. The atmosphere of a nation at war is not conducive to successful research, which generally calls for quietness, detachment and a mind at rest. The record of work carried out in the year under review in this report is a tribute to the ability of research workers to apply themselves to their investigations, for the period was anything but free from political unrest and international foreboding. We are reminded in the report that war conditions in themselves offer special opportunities for the acquisition of knowledge which is by no means of emergency interest only. That research workers are able to take advantage of these opportunities is shown in the history of the war of 1914-1918 and of the Medical Research Committee (which later became the Medical Research Council). The Medical Research Committee came into being just before the war in 1914, and it initiated investigations, productive of important and lasting results, in such subjects as surgical shock, chemical warfare, anaerobic bacteria and their infections, amoebic and bacillary dysentery, physiological problems associated with flying, trench nephritis and gunshot wounds of the chest. Conditions in industry, such as fatigue, were also studied, and the information gained has been of the greatest value ever since.

<sup>1</sup> Committee of the Privy Council for Medical Research. Report of the Medical Research Council for the Year 1938-1939; 1940. London: His Majesty's Stationery Office. Medium 8vo, pp. 171. Price: 3s. net.

The Medical Research Council raises the question of what contributions medical investigation can make in the present war, and makes instant reply to its own question that an answer cannot possibly be given at present. At the same time, in spite of substantial knowledge already gained, "it is quite certain that many of the old problems of shock, of wound infection and of the hygiene of warfare will again claim attention". One of the main objects of research, we are told, must be to find how in wound shock the "insults" to the nervous system are related to the liberation of toxic chemical factors. Chemotherapy will play an important part in the treatment of wounds, though more work needs to be done in connexion with the use of sulphanilamide compounds in gas gangrene. In pneumonia and cerebro-spinal meningitis these drugs will almost certainly prove to be invaluable; more research is needed, however, and particularly in regard to the avoidance of harmful effects likely to be produced by them. In addition to these obviously important spheres of investigation others will doubtless present problems, and it can safely be predicted that when they are energetically probed results will be forthcoming. In the war of 1914-1918 a consultant physician was appointed in France, in the person of Professor T. R. Elliott, and he was able to transmit information from the Army Medical Services to the Medical Research Committee on the special problems urgently needing inquiry, "so that the attention of investigators at home could be quickly directed to the subjects requiring study". This precedent will probably be followed in the present conflict and we may rest assured that new problems will be discovered. There is no doubt also that the Medical Research Council will, in conjunction with the Army Medical Service, make every effort to elucidate them. To this end the grant-in-aid to the Medical Research Council from Parliament will certainly be continued, if not increased. This should not be lost sight of by governmental authorities in Australia, who should encourage research by Australian workers into problems created by the war. The Australian Imperial Force has already among the officers of its Army Medical Corps many men who

are capable of making careful observations in the field and of carrying out investigations if sufficient time and equipment are provided for them. They should be aided by workers at home, who need not be attached to the Defence Department, but who may be civilians, and who in these circumstances should be maintained by the National Health and Medical Research Council.

One important and final consideration remains. Research will produce results; but it is not the duty of research workers, nor is it possible for them, to translate their findings into effective action. Readers should be reminded in this connexion of the account given by Colonel A. Graham Butler in the second volume of his work, "The Australian Army Medical Services in the War of 1914-1918", of the inexcusable delay shown in the adoption of life-saving measures, because someone wanted credit or because someone was jealous of someone else, or because senior officers used to rubber stamp methods could not see beyond red-tape regulations. Human nature does not change, and there is just as much danger of this reprehensible kind of obstruction happening now as it did twenty-five years ago. To be on the watch for it, knowing that it may happen, is half the battle.

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### Current Comment.

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#### FROST-BITE AND TRENCH FOOT.

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EUROPE is just recovering from a winter of intense and almost record cold. Spread out over part of France and Germany are armies of men, many of whom have not enjoyed the comparative comfort of elaborately constructed underground defences. These considerations render timely an article by Raymond Greene on frost-bite and trench foot.<sup>1</sup> Greene has accompanied two British expeditions to the high Himalayas, and is thus particularly well equipped to fill in this gap in our text books.

The underlying pathological processes in trench foot and frost-bite differ only in degree. Cold, intense and dry, produces frost-bite. Cold, less intense but combined with prolonged damp, produces trench foot. Twenty-five years after the Great War, it is not superfluous to recapitulate the clinical features of trench foot. Thompson (1937) states:

<sup>1</sup> *The Lancet*, February 17, 1940.



Trench foot is heralded by a numbness of the feet, which often changes to great pain when the boots are removed. The skin is first white, then mottled and bluish-red. Blisters containing straw-coloured or blood-stained fluid appear and may break down to form crusts or indolent ulcers. The toes may turn black, and the nails may be loosened. Usually moist gangrene follows. There are changes in sensation, both anaesthesia and paraesthesia. In the absence of sepsis or gas gangrene, properly treated patients make an uneventful recovery, though loss of tissue may be considerable.

The essential histological change is damage to the vessel walls, followed by transudation and oedema, or even rupture and haemorrhage into the surrounding tissues. University College workers have shown that the skin freezes at a point which varies according to its moisture and greasiness. Wet skin freezes at a comparatively high temperature ( $-2.2^{\circ}\text{C}.$ ), and unwashed skin or skin treated with olive oil at a comparatively low one ( $-25^{\circ}\text{C}.$ ). The decreased cardiac output and slower circulation rate at high altitudes facilitate the appearance of frost-bite. According to Greene, the warming effect of oxygen at great altitudes is noticeable. He employed oxygen in cases of frost-bite at an altitude of 23,000 feet.

With regard to prophylaxis, certain individuals of poor physique, who are debilitated or are affected by disease that reduces peripheral circulation, should not be permitted in any situation that exposes them to the risk of extreme cold. Clothing is of the utmost importance, and care must be taken to avoid any constriction of the limbs. The disappearance of puttees should reduce the incidence of trench foot; but the danger of ill-fitting boots is often forgotten. Suppleness of boots is as important as size. Darned socks are dangerous, or those made from hard wool. The wearing of additional socks is useful, providing the boots are large enough to permit it. A maximum of forty-eight hours in the trenches in wet weather was suggested in 1915 by Smith, Ritchie and Dawson. Trench foot is commoner during a thaw at a temperature just below freezing point than in dry frosty conditions at a temperature ten degrees lower.

In the treatment of the acute stage the application of heat above that of the human body has always been recognized as extremely harmful, because the stagnant circulation in the affected part is incapable of carrying away heat. In Greene's view, even rubbing the part with snow is highly dangerous. The tissues are already damaged, delicate and brittle, and any further mechanical manipulation by traditional and well-meant massage or by a machine of the "Pavex" variety, producing intermittent venous occlusion, may do permanent harm. The affected foot should therefore be kept strictly at rest. It should be thoroughly but gently cleaned and wrapped in many layers of sterile wool. The patient should be given extra clothes and blankets and an abundance of hot drinks, but no alcohol. He is removed by stretcher as soon as practicable to a place of comparative warmth and comfort. Contiguity with another human body provides the best substitute if the patient has to remain in the open air. Complete rest, bodily

comfort, sufficient sleep and good food will ensure the recovery in cases of less severity. If gangrene ensues, Greene advocates the avoidance of haste, as the level of skin gangrene is usually proximal to that of the deeper tissues, and the final line of demarcation proves to be distal to the initially anticipated line.

It appears, therefore, that, according to an expert, considerable damage can result from misdirected first aid to patients with frost-bite and trench-foot. The commonly used first-aid manuals from which the services, ambulance personnel and voluntary aid detachments obtain their instructions, should therefore be immediately altered in respect to the conventional direction to "rub with soft snow". Chiropody, better drained trenches, good footwear, sufficient men in reserve, and proper first-aid instruction should do much to keep front-line soldiers on their feet, and the regimental medical officer will improve his own statistics considerably if he teaches his men the principles of prevention reiterated by Greene.

#### SURGICAL TREATMENT OF TRACHEO- OESOPHAGEAL FISTULA.

CONGENITAL malformations represent a problem for surgeons and a tragedy for parents. Some malformations, such as syndactyly, harelip and cleft palate, can be treated with reasonably successful results. Others, including some of those involving the heart, appear as yet to be beyond the scope of even the most able and enterprising of operators. Occupying an intermediate place, and presenting several interesting features, is the condition of atresia of the oesophagus with tracheo-oesophageal fistula. This abnormality is incompatible with survival; if it is untreated the infant dies from starvation and inhalational pneumonia, usually within a few days to a fortnight. So far, in no case has treatment been successful; but N. L. Leven, who discussed the subject in *The Journal of Thoracic Surgery* in 1936, reported a case in which survival was prolonged for 98 days.

It will be recalled that at one stage during development the trachea and oesophagus form a single structure, which is subsequently divided into two parallel tubes by the ingrowth and fusion of lateral septa. If the septum is deficient at its caudal end, the condition of simple tracheo-oesophageal fistula results. If, however, the septum is complete, but inclines dorsally at its caudal end, it will close off the upper from the lower part of the oesophagus, and while the upper part of the oesophagus ends blindly, the lower will communicate with the trachea. This is the condition of atresia of the oesophagus with tracheo-oesophageal fistula, and forms the subject of the present comment. An infant so affected will suffer violent attacks of coughing and vomiting on attempting to feed, and portions of food, together with secretions regurgitated from the stomach, will enter the lungs. It

will be seen, therefore, that for operative correction of the anomaly to be successful, it must provide a permanent means of administering nourishment, together with protection of the lungs from inhalation of food and secretions. Simple gastrostomy does not suffice, and in fact hastens the onset of aspiration pneumonia. Ideas regarding treatment seem at present to be directed along one or other of two channels. One scheme, followed by Leven and more recently by H. A. Gamble,<sup>1</sup> favours the performance of a gastrostomy in such a manner as to permit feeding while preventing regurgitation, and to take measures to prevent mucus and other secretions from reaching the lungs. Gamble divided the stomach between clamps and arranged the lower segment, comprising some three-quarters of the stomach, to receive food through a gastrostomy opening. The upper segment, which was large enough to permit a later anastomosis with the remainder of the stomach, was also left with a surface drain to allow the escape of fluids. Mucus and saliva in the pharynx and upper part of the œsophagus were aspirated by a catheter introduced through the nose. It was proposed at a later date to perform a direct attack on the fistula and to restore the continuity of the stomach. Operation was performed on the third day, and the infant made satisfactory progress at first, but died on the fifteenth day from general peritonitis due to perforation of a gastric ulcer. The latter complication was thought to be due to ligation of a bleeding point on the lesser curvature of the stomach, and the interesting and important autopsy observation was that the lungs were found to be free from pneumonia. An example of the other method of treatment is given in a case reported by R. Shaw.<sup>2</sup> This surgeon, after two days' preparation, made a direct attack on a tracheo-œsophageal fistula through a left parascapular incision on the fifth day after birth. The ribs, from the second to the sixth, and the intercostal structures, were divided, and the pleura was stripped from the vertebrae to expose the mediastinum. The lower part of the œsophagus was separated from the trachea and the fistulous opening in the latter was closed. The two parts of the œsophagus were anastomosed over a catheter which had been passed from the mouth into the stomach, and which was left *in situ* for feeding. The infant died on the twelfth day after operation, the immediate cause of death being a transfusion which caused hæmoglobinuria and blockage of the renal tubules with hæmaturic crystals. At autopsy it was found that there was extensive pneumonia and that the anastomosis had broken down, the gap being surrounded by granulation tissue without epithelial lining.

Although success has so far eluded the surgeon, it may reasonably be claimed that operative treatment is at least feasible. A prerequisite of effective treatment is early diagnosis. Every infant which chokes, vomits and coughs on attempting to feed,

and regurgitates excessive amounts of mucus, should be suspected of an œsophageal malformation. Investigation must be instituted at once. A small amount of barium suspension should be given and a radiograph taken. Bronchoscopy should be performed and it is advised that this should follow immediately after X-ray examination to permit the removal by suction of any barium which may have entered the air passages. Operation at the earliest possible moment is advisable, because the new-born infant is less susceptible to shock and the respiratory and alimentary tracts are relatively sterile. Finally, intervention, in view of its desperate nature, is best undertaken at once for sentimental reasons. The loss of a day-old infant is a minor tragedy compared with that of one which the mother has fondled and perhaps suckled.

#### SOYA BEAN FLOUR IN INFANT FEEDING.

THERE are few who deny that breast milk is the ideal infant food. We are fortunate in that if this supply fails, a number of very satisfactory substitutes are available, and our public health is sufficiently organized that even the poorest mother can have access to these substitutes. In many countries, however, notably India, Africa and the East, this is not so, for the distribution of fluid milk is impossible and the cost of any available dried substitute is prohibitive. The result is that for the infant death is the alternative to breast feeding.

Soya beans provide a food rich in fat and protein and with a relatively low carbohydrate content. Flour made from these beans by a variety of processes is on the market and is much cheaper than dried milk. The value of soya bean foods depends on the method by which they are prepared. The following are the main types of flour available: (i) Dry-ground unheated flour, which has a bitter taste and in which the protein is indigestible. (ii) Flour made from the residue, the "pressed cake", after the oil has been removed for commercial use. This has been treated at a high temperature, as a result of which the nutritive value of the protein is greatly increased; but it is lacking in fat and presumably in vitamins A and D. (iii) Wet-ground flour, which brings some of the protein into suspension, as in the soya milk of China. This flour turns rancid easily and its protein is largely unavailable. (iv) Dry-ground flour from roasted beans, probably a useful form. (v) Flour prepared by patent processes, which involve heating to render the protein digestible and steam distillation to remove the bitter taste. This is probably the most useful.

It has been found possible to provide a food closely resembling breast milk in its food and mineral content by mixing equal parts of full-cream dried cow's milk and soya bean flour. Helen MacKay,<sup>1</sup> working with the aid of a grant from

<sup>1</sup> *Annals of Surgery*, May, 1938, page 701.

<sup>2</sup> *The Journal of Thoracic Surgery*, December, 1939.

<sup>1</sup> *Archives of Disease in Childhood*, March, 1940.

the Medical Research Council of Great Britain, has recently investigated the value of such a soya bean milk mixture, which she has called yolac. Its cost is but slightly more than half that of dried cow's milk. Compared with breast milk, cow's milk is high in protein and low in carbohydrate and fat. The same applies to soya bean flour prepared by the steam distillation process as used by MacKay, so sugar must be added to the soya bean milk mixture to raise the carbohydrate content of the food. The deficiency of iron and the excess of sodium chloride in cow's milk are adequately balanced by the high iron and low sodium chloride content of soya bean flour. The amount of magnesium, calcium and phosphorus, and the ratio of the last two are also adequate in the yolac mixture. This dried food is prepared for feeding simply by mixing one part with eight of warm water. The caloric value of such a food is very slightly lower than that of a full-cream dried milk mixture.

In MacKay's experiment the babies lived in their own homes. The test group had yolac *plus* sugar, orange juice and cod liver oil emulsion. A control group had full cream dried milk *plus* iron, sugar, orange juice and cod liver oil emulsion—in short, the best possible artificial food the author could provide. Both groups made satisfactory progress. The control group gained slightly more weight and maintained a more uniform level of blood haemoglobin than the test group. Bone calcification was satisfactory in both groups. The incidence of illnesses was approximately the same in both groups; but the yolac group showed a preponderance of alimentary upsets, and the controls of respiratory infections. The stools tended to be softer in the yolac group, constipation being not uncommon in the controls. Unless the food was introduced gradually the yolac was not so well tolerated as the whole dried milk, tending to cause colic.

It is plain that soya bean flour mixed with dried milk provided a satisfactory and cheap artificial food for these infants. Only one such mixture was tried in this investigation. Further experiment may produce even better mixtures. Owing to its relative cheapness such a food merits extensive trial in countries where, for economic reasons, a satisfactory substitute for breast milk has hitherto been unavailable.

## British Medical Association News.

### SCIENTIFIC.

A MEETING of the Section of Urology of the New South Wales Branch of the British Medical Association was held at the Robert H. Todd Assembly Hall, British Medical Association House, 135, Macquarie Street, Sydney, on March 29, 1940.

#### The Harris Operation of Suprapubic Prostatectomy with Closure.

DR. RICHARD HARRIS showed a cinematograph film on the Harris operation of suprapubic prostatectomy with closure.

He said that he wished to pay tribute to the pioneering work that was done by his brother, the late Dr. S. Harry Harris, with whom it had been his privilege to be closely associated. He and others who had witnessed the work of the late Harry Harris, could not help but be impressed by the intense concentration and the meticulous care that were the foundations on which Harry Harris had built his success. This close attention to detail was revealed in the technique, cinematographic films of which he would show, and it played an important role in the achievement of successful results.

Many methods and many variations had been tried and discarded before the final technique, which was first practised in October, 1927, was evolved. An ideal operation of prostatectomy should provide for: (i) the control of hæmorrhage by suture, (ii) the elimination of sepsis by the covering of the raw surfaces, (iii) the prevention of post-operative recurrence of obstruction by the reformation of the prostatic urethra. Complete closure, though of major importance on account of the increased comfort and the shortened convalescence it brought about, should not be regarded as of primary importance and should in no circumstances be carried out unless the local conditions warranted it.

Dr. Harris went on to say that, although no claim to be a panacea for all the ills of prostatectomy was made for the technique, Harry Harris believed that his operation represented a decided advance towards the realization of the ideal. If the operation was to be successful, attention to detail was essential. Surgical asepsis and antiseptics in the care of the indwelling catheter must be a ritual rigidly observed, both in the pre-operative and in the post-operative stages. Any carelessness in this regard would not only render the operation impracticable, but would reap its own harvest of post-operative septic sequelæ. By the adoption of the bimanual intraurethral method of enucleation of the prostate the mucosal covering of the greater part of the prostatic urethra was left intact. No plastic reconstruction could make up for the loss of the entire prostatic urethra, and the consequent long narrow stricture was one of the most resistant to cure of all post-operative complications. Freyer's methods of operation had served their purpose and should now be discarded. The Harris operation demanded complete visual exposure of the bladder base. Harry Harris employed a short transverse incision, two to two and a half inches long, and devised a set of self-retaining electrically lighted bladder retractors. Thus post-operative drainage of the bladder and of the prevesical space could safely be dispensed with. On the other hand, when a long vertical or a long transverse incision was used, drainage of both areas had to be provided. The use of the Harris retractors rendered the technique equally applicable to the two-stage operation.

Dr. Harris then showed the cinematographic film entitled "The Harris Operation of Suprapubic Prostatectomy with Closure", with a running commentary. In conclusion Dr. Harris said: (i) that the operation of suprapubic prostatectomy with closure, as introduced in 1927 by the late S. Harry Harris, with its subsequent modifications, had been shown and that the technique had been employed in over 800 cases in the past twelve years with a mortality rate of under 3.5%; (ii) that the bimanual intraurethral method of digital enucleation of the prostate was a necessary integral part of the operation; (iii) that the experience of twelve years, without a single instance of recurrence of obstruction, warranted the claim that the method of retrigonization, or reconstruction of the floor of the prostatic urethra, which had been shown and described, should be regarded as an essential part of any operation of prostatectomy. Dr. Harris finally stressed the fact that complete closure must not be regarded as the primary aim. It should be practised only when the local conditions warranted it. It should be regarded as the fulfilment of a successful operation in a field rendered favourable for its accomplishment.



### Perurethral Resection for Obstruction of the Bladder Neck.

DR. R. J. SILVERTON gave a description of the technique of perurethral resection for bladder-neck obstructions. Before entering on the purely technical discussion Dr. Silverton mentioned that the indications for this somewhat new operation varied a good deal among different urologists and that this variation seemed to be influenced chiefly by the degree of skill in the technique of endoscopic resection possessed by individual operators. So far as Dr. Silverton himself was concerned, it was chiefly a mechanical problem. The main obstacle to the efficient performance of endoscopic resection was the large size of the prostatic, or, as it should be called, periurethral, adenoma; and in all such cases, provided the patient was not a "bad risk", suprapubic prostatectomy was the operation of choice. The indications for the perurethral operation were therefore all varieties of "*prostatism sans prostate*", small fibrous types of obstructing prostate, carcinoma of the prostate not involving the floor of the bladder, and small or moderate adenomatous obstructions. When patients with large adenomatous obstructions were "bad risks", suprapubic cystostomy was life-saving as a preliminary, and later a multiple-session resection could be attempted if the risk of suprapubic operation was still considered too grave.

The preparation for endoscopic resection was usually by catheter; but in practically all early cases in which the urine was clear and the renal efficiency was moderate or good as measured by the phenol-sulphone-phthalein test, cystoscopic examination could be performed at once and could be immediately followed by endoscopic resection. In many cases, however, a catheter was tied in, the bladder was irrigated at intervals and the renal efficiency was tested every other day. It was preferable to secure clear urine; but there was no doubt that, on the score both of urinary infection and renal efficiency, less prolonged preparation was required for resection than for prostatectomy.

With regard to the actual technique of the resection operation, Dr. Silverton's entire experience had been with the McCarthy loop resectoscope, in which the excellent "foroblique" telescope system of McCarthy was used. This instrument was solidly constructed, and all parts, including the loop electrodes, would withstand many years of heavy work, provided they were looked after, put together and cleaned solely by the surgeon. Vision was excellent, and details of the operation could easily be demonstrated to onlookers in a clear fashion. The "Bakelite" sheath of the instrument was of 28 F. calibre. Dr. Silverton had not yet encountered after-stricture of the urethra from instrumental trauma, which was often mentioned in articles. The external meatus was cut by means of a stiff wire electrode if this was necessary. The "Bakelite" sheath should not be gripped tightly by the external meatus, for that interfered with freedom of movement of the instrument during the operation. Before the instrument was passed the urethra was carefully dilated by means of curved metal sounds from about 24 to 30 F. The electric unit employed was one of the spark-gap types of instrument; cutting was found to be quite adequate, while the instrument possessed very efficient coagulating properties, a point much appreciated by Dr. Silverton, since he preferred to secure as perfect a hæmostasis as was possible.

Dr. Silverton went on to say that the method of carrying out the resection could be either (a) an asymmetrical method, in which the middle and one lateral lobe were resected first, and then the opposite lobe later, or (b) a symmetrical method, both sides being resected evenly. Dr. Silverton did not care for very long sessions of resection, and if the actual operating time was to be much over half an hour, he preferred to leave the opposite lateral lobe, together with general trimming up, to a later session after an interval of five to seven days. This applied to all moderate-sized adenomatous obstructions. All small adenomata, most carcinomata which were suitable for resection, and all minor obstructions could be completely resected in one session. The second, or sym-

metrical method, was employed only occasionally, when a very large adenoma was present, and for some reason prostatectomy, normally the operation of choice in such cases, was considered too dangerous.

When the usual, or asymmetrical, method was employed strips of tissue were resected in the mid-line from the middle lobe or posterior commissure in cases of purely bilobed enlargements. From the middle line strips were cut to one side; but it was then observed that the corresponding lateral lobe prolapsed into the field and tended to cover over the cut surfaces near the middle line, so that, in order to secure visual clearance, one had to attack the lateral lobe at once, proceeding from its lower towards its upper or pubic part. This principle of securing visual clearance was observed all through the operation, and whenever a cut bleeding portion of tissue was obscured in any way, the tissue causing the obscuration had to be resected before coagulative hæmostasis was applied.

The extent of resection proximally was onto the trigone only so far as was necessary to remove actual adenomatous tissue. The trigonal tissue itself was not resected except where it actually covered adenomatous tissue. After adequate resection the appearance at the junction of the trigone and prostatic cavity was that one was more or less flush with the other. In almost all parts of the prostatic cavity itself the adenomatous tissue was resected until circularly disposed sphincteric fibres were seen. In the strong light of the illuminating lamp the adenomatous tissue appeared creamy in colour, and of a nodular, granular texture, while the musculo-fibrous tissue, which indicated that the plane of the surgical capsule around the adenoma had been reached, had a white, concentrically striated appearance and its general surface was smooth in contrast to the lumpiness of the adenomatous tissue. In a distal direction the resection was carried until all adenomatous tissue had been removed up to the *colliculus seminalis*. This structure was usually not cut at all, but Dr. Silverton thought that no harm would arise if it were shaved off superficially. On each side, however, the lateral adenoma sometimes extended a little distally beyond the colliculus, and such adenomatous tissue had to be carefully resected. It was generally considered that extension beyond the colliculus in a distal sense might weaken the control of the urine by the sphincter of the membranous urethra, causing temporary or permanent incontinence, so deep cutting in that region was avoided.

In an anterior, or rather pubic, direction the lateral lobes could be resected away completely, right to the middle line. In many cases Dr. Silverton had done this; but in others a certain amount of adenomatous tissue had been left anteriorly, and yet the functional result had been good. Nevertheless, the chief difficulty of this operation was to secure total, or at least adequate, removal of the neoplastic tissue without going beyond the confines of the surgical capsule which immediately surrounded it.

Bleeding vessels were coagulated with the bottom of the resecting loop, the coagulating current coming from the same unit as the cutting current, after a "switch-over". Dr. Silverton considered accurate hæmostasis to be of importance; but during the actual resection only large vessels, which spouted over the field like sheets of flame, needed coagulation, so that vision could be adequate. Apart from this important coagulation, time was spent on nothing but the actual resection of tissue. At the end of the operation Dr. Silverton preferred to coagulate even the minutest vessels, so that not a trace of pink remained in the irrigating fluid.

Dr. Silverton went on to discuss the unusual, or symmetrical, method. He said that tissue was resected evenly from both sides and the middle line for half an hour or less on the first occasion, according to the patient's condition. A week later, or later still if the patient's condition was not satisfactory, the symmetrical resection was carried still more distally, and so on at intervals until the colliculus was reached. If the adenoma was excessive in size, one could introduce the resectoscope through a perineal urethrotomy buttonhole; but in the

few symmetrical resections Dr. Silverton had performed he had so far not been forced to do this.

Dr. Silverton then quoted the case of a man, aged seventy years, suffering from a very large adenoma of the prostate; the urine was heavily infected and renal efficiency was poor. His local and general condition had not improved, even though a suprapubic cystostomy had been functioning for four months previously. Resection had been carried out safely and satisfactorily in four sessions by the symmetrical method, with a good result. About six months later the man returned with some symptoms of obstruction; they were relieved by a further resection of some lateral lobe tissue which had not been thoroughly cleared away earlier.

As an example of the comparative safety of this method in cases of severe infection Dr. Silverton discussed the management of a very dangerous case of advanced renal destruction. The patient was a retired inspector of police (C.F.), aged seventy years, whose urine was turbid and contained thick flakes of pus; bilateral pyonephrosis was revealed by excretion urography. He was treated first by suprapubic cystostomy. He was somewhat uræmic at the time. At the suprapubic operation a thick raised collar of adenoma was found, more suitable for prostatectomy; but so bad was his condition that Dr. Silverton determined there and then that he would attempt resection later on if the patient's condition improved at all. The patient recovered from the operation, but his general condition did not improve and his temperature swung vigorously up and down daily. However, about two months after the cystostomy operation, as his condition was showing no signs at all of improvement, resection was decided on and the operation was carried out in two sessions. The final result was good functionally; the temperature fell to normal and the urine cleared up a little, though actually remaining moderately turbid, as would be expected with bilateral pyonephrosis. The patient's general condition was vastly improved, however, and altogether the result was unexpectedly satisfactory. In any case, it showed that it was possible to carry out resection safely, even in the presence of gross sepsis. Superficial coagulation of the prostatic cavity during the resection probably accounted for local defence against absorption.

Finally, Dr. Silverton quoted the case of a member of Parliament, aged sixty-seven years, with advanced uræmic symptoms. Although the adenoma was not large, the operative attack was made in one very short first session, followed two weeks later by a second and final session, with an excellent result. The patient became uræmic after a catheter was passed, and again later after a simple cystoscopic examination, and had to be nursed back to safety very carefully on each occasion. It was considered that even a suprapubic cystostomy might have caused a fatal reaction, so Dr. Silverton decided on resection in multiple small sessions if necessary. The patient became very uræmic after the first session, but stood the second session remarkably well and was able to leave hospital ten days later. One month later he reported that he had resumed his parliamentary duties and had gained one stone in weight.

Dr. Keith Kirkland said he wished to thank the speakers for their papers. In the case of the Harris operation the principles had become so well established, and in this country so generally proved, that there was little room for comment. Dr. Kirkland said he was not prepared to accept Dr. Silverton's technique of resections. He asked what Dr. Silverton did in the case of the prostatic patient who was physically fit. Dr. Kirkland had rather gathered that Dr. Silverton's technique was to perform multiple resections in all cases. Were there no cases in which Dr. Silverton completed the operation in one sitting?

Dr. Kirkland went on to say that he considered the best "resectionists" he had seen in the United States of America who used the loop to be Nesbit and Alcock. The former had introduced an instrument which gave him a third-dimensional appreciation of the prostate, in that it was operated by one hand, and a finger of the other hand

was placed in the rectum to lift the prostate and assess the amount of tissue to be removed. In both cases these men began the removal of tissue high up on the lateral lobes and cleaned from above downwards. Nesbit had narrowed the indications for perineal resection to cases in which the anterior urethra would not comfortably admit the instrument and cases in which the suspensory ligament of the penis was short. Thompson, too, at the Mayo Clinic, appreciated the value of lifting the prostate, and in many cases, using his "cold punch" method, he had an assistant put a finger in the rectum for the second half of the operation. Dr. Kirkland said that he had considerably extended the scope of resection in his practice since studying American methods, but he did not consider any measure equal to suprapubic prostatectomy on the lines of the Harris operation for the larger adenomatous prostates.

Dr. Henry Mortensen, of Melbourne, said that he agreed with Dr. Kirkland. He thought preparation very important, despite the belief of Thompson, of the Mayo Clinic. He thought that the indications for multi-stage resection were very limited, and that one hour should be the limit to any operation for resection; he favoured the idea that if it was estimated that more time would be needed, this was an indication for suprapubic prostatectomy. He considered that the post-operative standards of cure should approach those of prostatectomy. He described Nesbit's technique in some detail. Regarding hæmostasis, Dr. Mortensen said that he coagulated only the main vessels and was opposed to sending the patient back to bed with clear urine, as this involved too much coagulation, with consequent sloughing. Dr. Mortensen said that he used Congo red intravenously as a routine hæmostatic and employed ligation of the vas as a routine measure.

Dr. J. S. Laibley, from the chair, further described Nesbit's technique and stressed the need for complete adenomectomy. He said that he used pressure with a finger in the rectum as an aid to this end.

Dr. Silverton, in reply, emphasized the importance of removing "buttons" of adenoma alongside the *colliculus seminalis*, and agreed that the ideal was to remove all adenomatous tissue. He did not by any means advocate multiple resections.

## Naval, Military and Air Force.

### APPOINTMENTS.

THE undermentioned appointments, changes *et cetera* have been promulgated in the *Commonwealth of Australia Gazette*. Number 106, of June 13, 1940.

#### AUSTRALIAN IMPERIAL FORCE.

##### Australian Army Medical Corps.

*To be Colonel*—Lieutenant-Colonel (Temporary Colonel) W. E. Kay, D.S.O., V.D., Australian Army Medical Corps, 2nd Military District, and to command the 5th Australian General Hospital, 1st May, 1940. *To be Lieutenant-Colonel*—Lieutenant-Colonel K. J. G. Wilson, Unattached List, 1st Military District, and to command the 2nd/2nd Casualty Clearing Station, Lieutenant-Colonel (Temporary Colonel) F. H. Beare, E.D., Australian Army Medical Corps, 4th Military District, and to command 2nd/6th Field Ambulance, and Lieutenant-Colonel L. E. LeSouef, Australian Army Medical Corps, 5th Military District, and to command the 2nd/7th Field Ambulance, 10th May, 1940, Lieutenant-Colonel A. H. Green, Australian Army Medical Corps, 3rd Military District, and to command the 2nd/5th Field Ambulance, 19th April, 1940, and Major (Temporary Lieutenant-Colonel) S. H. Lovell, Australian Army Medical Corps, 2nd Military District, and to command the 2nd/4th Field Ambulance, 1st May, 1940.

**2nd Reinforcements.—To be Captain—**Captain I. L. Kelf, Australian Army Medical Corps, 2nd Military District, 29th April, 1940.

**3rd and 4th Reinforcements.—To be Captain—**Honorary Captain G. M. Turnbull, Reserve of Officers (A.A.M.C.), 4th Military District, 1st May, 1940.

**To be Lieutenant-Colonel—**Major D. B. Loudon, 6th May, 1940. **To be Major—**Captain S. W. Williams, 6th May, 1940.

#### AUSTRALIAN MILITARY FORCES.

##### EASTERN COMMAND.

##### Second Military District.

##### Australian Army Medical Corps.

**To be Captains (provisionally)—**Frederick Neil Street, 6th April, 1940; Gordon David Cumming, 3rd May, 1940; William Douglas Sturrock, 6th May, 1940, and Alexander Campbell Budge, 10th May, 1940; Captains (provisionally) J. B. McElhone, A. G. Cumpston and A. C. R. Sharp are brought on the authorized establishment, 1st November, 1939, 23rd April, 1940, and 7th May, 1940, respectively; Major (temporarily) W. E. Audley is seconded for duty with the Recruit Training Depot, 8th March, 1940; Captain (provisionally) I. L. Kelf is seconded for duty with the Recruit Training Depot, Australian Army Medical Corps Wing, 25th March, 1940; Captain (provisionally) H. G. Cummine is transferred to the Reserve of Officers (A.A.M.C.), 1st May, 1940.

Captain (provisionally) G. D. Cumming is borne supernumerary to establishment pending absorption, 3rd May, 1940.

##### SOUTHERN COMMAND.

##### Third Military District.

##### Australian Army Medical Corps.

**To be Captain (provisionally)—**Josiah Mark Bonnin, 30th April, 1940.

##### Australian Army Medical Corps Reserve.

**To be Honorary Captains—**Cecil Balfern Neate, George Edwin Foreman, Allick Ian Chapman, Bessell Fauckner Brown and Keith Henry Tweeddale, 10th May, 1940.

##### Fourth Military District.

##### Australian Army Medical Corps.

Honorary Captains G. McL. Turnbull and F. J. Fenner are appointed from the Reserve of Officers (A.A.M.C.) and to be Captains (provisionally), 30th April, 1940, and 9th May, 1940, respectively.

##### WESTERN COMMAND.

##### Fifth Military District.

##### Australian Army Medical Corps.

Captain K. F. Wallace is appointed from the Reserve of Officers (A.A.M.C.), 9th May, 1940; Honorary Captains A. J. King, D. W. Macpherson, B. St. P. Gillett and M. Mayrhofer, are appointed from the Reserve of Officers (A.A.M.C.), and to be Captains (provisionally), 9th May, 1940. The notification respecting the date of the promotion of Major (temporarily) R. G. Williams, which appeared in Executive Minute No. 48/1940, promulgated in *Commonwealth Gazette*, No. 49, of 14th March, 1940, is amended to read, 19th January, 1940.

## Correspondence.

### CALCIUM CARBONATE.

SIR: Under the 1914 British Pharmacopœia, when calcium carbonate was ordered it was the general practice to dispense *Creta Preparata*, known as *Creta* in the 1932 British Pharmacopœia.

The only substance allowable under the 1932 British Pharmacopœia when calcium carbonate is prescribed is calcium carbonate (the precipitated calcium carbonate), which is microcrystalline, the amorphous calcium carbonate being known only as *Creta*.

It is the general opinion among pharmacists that *Creta* is therapeutically better than *Calcii Carbonas Precipitatus*.

When I have contacted doctors they have directed the use of *Creta*. Some doctors seem to think they are prescribing *Creta* when ordering calcium carbonate. The official preparations in the British Pharmacopœia, namely, *Pulvis Creta Aromaticus* and *Pulvis Creta Aromaticus cum Opio*, are compounded with *Creta*.

If you would kindly publish this letter, the position might be clarified. A doctor could order *Creta* or *Calcii Carbonas*, according to his desire.

Yours, etc.,

C. F. P. KILLINGER,  
Pharmacist.

Lakemba,  
New South Wales,  
June 1, 1940.

### MODERN METHODS IN PÆDIATRICS.

SIR: Dr. Arden has given me an outline of the diet scale of the Brisbane Children's Hospital, which pleases me much. May I ask you to publish this in justice to him, and for the encouragement of others.

He writes: "The hospital diet is now as good as I can make it within the economic limits that are set me: 1½ pints of milk per day (average), 4 eggs a week, 2 fruits, for instance apple and banana, daily. Approximately 75 per cent. of the bread eaten is wholemeal, and in addition 'Cerevitamin' is given daily with breakfast as a routine, and radiostoleum during the winter months."

Yours, etc.,

Brisbane,  
June 10, 1940.

A. JEFFERIS TURNER.

### THE MEDICAL EXAMINATION OF RECRUITS.

SIR: At a meeting of the Psychiatric Section of the Victorian Branch of the British Medical Association held recently in Melbourne, it was made clear that no lead has come from the authorities as to the best way in which those with special knowledge of psychiatry and psychotherapy can best serve in this time of national emergency.

It is beyond question that the services of the psychotherapist will be required to deal with the after-effects of war strain both on the soldiers and on the civilian population.

However, that problem has hardly arisen yet, although cases have come to my notice of enlisted men who have already broken down without seeing any active service and who are merely being detained in rest homes or mental hospitals.

There is, however, an immediate problem which I feel is not being sufficiently recognized, and that is the psychological examination of recruits with a view to detecting personality disorders of importance from a military point of view.

It is true that many of the slighter cases of psychoneurosis do not matter in this connexion and that the gross psychotics will be effectively weeded out by the examining doctors; but there is a residue of psychopathic personalities which are difficult to detect, except with the expenditure of considerable time and the use of specialized knowledge and experience. Some of these psychopaths, at best, will be a nuisance and a liability in the army, and, at the worst, a positive menace if suicidal or undirected murderous tendencies should develop under war strain. Under conscription these types, which easily escape detection, would make a formidable problem; and even now there is a real danger of their inclusion in the ranks.



Conversely, there are certain types—the obsessives, certain kinds of homosexual, and the gangster types—who can respond to "morale" of the right kind, and, though apparently very peculiar, generally make good soldiers, but are in danger of being excluded by superficial observers, thus losing valuable material for the fighting forces.

I am at present working with a number of psychopaths who were breaking down under the threat of war and who are now adjusting themselves to it; several of them, after treatment, have volunteered and been accepted.

It seems to me that doctors with special training in personality disorders and their treatment would prove of great value if doubtful cases were referred to them, thus lessening the risk of trouble developing in the line, such as the panic which a real psychopath can easily cause.

Yours, etc.,

335, St. Kilda Road,  
Brighton,  
Victoria.

June 12, 1940.

H. SELBY LINK.

SIR: The letters in your columns relating to the physical fitness of recruits and soldiers is interesting indeed to one who had to face the problems for some years between 1914-1918.

The main object is not to find out whether the soldiers suffer from certain disabilities, though that of course is an essential part of the work, but to find out whether they can be put to any kind of work. An extreme case was put to the able and much respected D.M.S. under whom I served. "If you found a man able to do some work but whose death was probable in six months' time, would you employ him?" He answered: "Certainly, as long as he could carry on."

The medical man in private practice is rightly seeking for any indication of disease and warning the examinee of his condition. The military medical officer, whilst not unsympathetic, places military necessity first and asks himself to what useful work can he be placed.

Totalitarian war is war indeed, and every man and woman and even child can be employed in some fashion.

In Lord Allenby's army, when the organization, both military and medical, became very efficient, it required at least two supporting men to keep one man in the fighting line. With any slackness it will require many more.

Newly joined medical officers, skilled in the civilian mode of thought, were at first—I will not say a nuisance—but certainly not helpful until they adapted themselves to the military problem. A sound medical military service can render victory possible, and a service steeped in civilian mode of thought can render defeat certain.

Yours, etc.,

JAMES W. BARRETT.

103-105, Collins Street,  
Melbourne, C.I.  
June 18, 1940.

#### FIRST AID AND THE TOURNIQUET.

SIR: I find too frequently that first aiders have no proper conception of the difference between a tourniquet tight enough to control bleeding and one tight enough to make it worse. The matter is sufficiently serious to warn lecturers to spend more time on the point. A student who does not comprehend this should be failed.

Another dangerous fallacy which requires exposure is the teaching that return of blood to an area blanched by pressure is a sign of active circulation. It is nothing of the sort, and indicates only that the tissues are elastic and the blood fluid. Proof may easily be obtained by applying a tourniquet to an arm without first emptying it of blood, and this sign will be found active for some minutes, fully time enough for our first aider to leave a

splint compressing the brachial artery, press his finger in and depart happy, leaving the limb to die. Indeed the patient himself could be already dead!

Yours, etc.,

CRAWFORD McKELLAR.

81, Glenayr Avenue,  
Seven Ways,  
North Bondi,  
New South Wales.  
(Undated.)

### Proceedings of the Australian Medical Boards.

#### QUEENSLAND.

THE undermentioned have been registered, pursuant to the provisions of *The Medical Act, 1939*, of Queensland, as duly qualified medical practitioners:

Finkle, Edmund Wesley, L.R.C.P. and S. (Edinburgh), L.R.F.P. and S. (Glasgow); 1937, Bellbird, New South Wales.

Newman, Norman Ludlow, M.B., B.S., 1937 (Univ. Sydney), c.o. Dr. Kelly, Gympie.

The following additional qualification has been registered:

Hill, James Allan (M.B., 1938, Univ. Sydney), B.S., 1938 (Univ. Sydney), Cooroy.

### Books Received.

THE PRINCIPLES OF ANATOMY: AN INTRODUCTION TO HUMAN BIOLOGY, by A. A. Abbie, M.D., B.Sc., Ph.D.; 1940. Sydney: Angus and Robertson Limited. Medium 8vo, pp. 143, with illustrations. Price: 10s. 6d. net.

LEPROSY, by Sir L. Rogers, K.C.S.I., C.I.E. M.D., F.R.C.P., F.R.C.S., F.R.S., I.M.S., and E. Muir, C.I.E., M.D., F.R.C.S.; Second Edition; 1940. Bristol: John Wright and Sons Limited. Demy 8vo, pp. 272, with illustrations. Price: 15s. net.

GREEN'S MANUAL OF PATHOLOGY, revised and enlarged, by H. W. C. Vines, M.A., M.D.; Sixteenth Edition; 1940. London: Baillière, Tindall and Cox. Royal 8vo, pp. 1174, with 701 illustrations. Price: 31s. 6d. net.

THE NEUROGENIC BLADDER, by F. C. McLellan, M.S., M.D.; 1940. London: Baillière, Tindall and Cox; Baltimore: C. C. Thomas. Medium 8vo, pp. 222, with illustrations. Price: 22s. net.

BLOOD GROUPS AND BLOOD TRANSFUSION, by A. S. Wiener, A.B., M.D.; Second Edition; 1940. London: Baillière, Tindall and Cox. Super royal 8vo, pp. 323, with 52 illustrations. Price: 27s. 6d. net.

AN INTRODUCTION TO THE PRINCIPLES AND PRACTICE OF HOMOEOPATHY, by C. E. Wheeler, M.D., B.S.; Second Edition, revised with the assistance of J. D. Kenyon, M.B., Ch.B., L.R.C.P., B.Sc.; 1940. London: William Heinemann (Medical Books) Limited. Demy 8vo, pp. 352. Price: 15s. net.

PROTOZOOLOGY, by R. R. Kudo, D.Sc.; enlarged and completely rewritten edition of "Handbook of Protozoology"; 1940. London: Baillière, Tindall and Cox. Medium 8vo, pp. 700, with 291 illustrations. Price: 36s. net.

PSYCHOLOGY AND PSYCHOTHERAPY, by W. Brown, D.M., D.Sc., F.R.C.P.; Fourth Edition; 1940. London: Edward Arnold and Company. Demy 8vo, pp. 268. Price: 12s. 6d. net.

DOCTOR JOAN OF AUSTRALIA AND INDIA, by B. Underhill, B.Sc.; 1940. London: Church of England Missionary Society. Crown 8vo, pp. 64, with illustrations. Price: 2s. net.

THE LOGIC OF MODERN PSYCHOLOGY, by C. C. Pratt; 1939. London and New York: The Macmillan Company. Demy 8vo, pp. 201. Price: 10s. net.

CLINICAL PRACTICE IN INFECTIOUS DISEASES, FOR STUDENTS, PRACTITIONERS AND MEDICAL OFFICERS, by E. H. R. Harries, M.D., M.R.C.P., D.P.H., and M. Mitman, M.D., M.R.C.P., D.P.H., D.M.R.E., with a foreword by W. A. Daley, M.D., F.R.C.P., D.P.H.; 1940. Edinburgh: E. and S. Livingstone. Demy 8vo, pp. 480, with illustrations. Price: 17s. 6d. net.

## Nominations and Elections.

THE undermentioned has applied for election as a member of the New South Wales Branch of the British Medical Association:

Mackay, Robert Wadie Gordon, M.B., B.S., 1939 (Univ. Sydney), Royal Prince Alfred Hospital, Camperdown.

THE undermentioned has applied for election as a member of the Tasmanian Branch of the British Medical Association:

Anderson, Keith Daubert, M.B., B.S., 1939 (Univ. Melbourne), Launceston General Hospital, Launceston.

## Diary for the Month.

- JULY 2.—New South Wales Branch, B.M.A.: Council (Quarterly).  
 JULY 3.—Western Australian Branch, B.M.A.: Council.  
 JULY 3.—Victorian Branch, B.M.A.: Branch.  
 JULY 4.—South Australian Branch, B.M.A.: Council.  
 JULY 5.—Queensland Branch, B.M.A.: Branch.  
 JULY 9.—Tasmanian Branch, B.M.A.: Branch.  
 JULY 9.—New South Wales Branch, B.M.A.: Executive and Finance Committee; Organization and Science Committee.  
 JULY 12.—Queensland Branch, B.M.A.: Council.  
 JULY 16.—New South Wales Branch, B.M.A.: Ethics Committee.  
 JULY 17.—Western Australian Branch, B.M.A.: Branch.  
 JULY 18.—New South Wales Branch, B.M.A.: Clinical meeting.  
 JULY 23.—New South Wales Branch, B.M.A.: Medical Politics Committee.  
 JULY 24.—Victorian Branch, B.M.A.: Council.  
 JULY 25.—South Australian Branch, B.M.A.: Branch.  
 JULY 25.—New South Wales Branch, B.M.A.: Branch.  
 JULY 26.—Tasmanian Branch, B.M.A.: Council.  
 JULY 26.—Queensland Branch, B.M.A.: Council.

## Medical Appointments.

Dr. A. T. Hoskins has been appointed Medical Officer of Health to the Longford Municipality, Tasmania.

Dr. A. G. Child has been appointed Government Medical Officer at Guyra, New South Wales.

Dr. A. E. Gatenby has been appointed a Medical Officer in the Office of the Director-General of Public Health of New South Wales.

Dr. W. W. Jolly has been appointed Honorary Clinical Assistant to the Surgical Section of the Royal Adelaide Hospital, Adelaide.

Dr. M. E. Chinner and Dr. H. W. Wunderly have been appointed Temporary Honorary Assistant Physicians at the Royal Adelaide Hospital, Adelaide.

## Medical Appointments Vacant, etc.

For announcements of medical appointments vacant, assistants, locum tenentes sought, etc., see "Advertiser", pages xiv-xvi.

CHILDREN'S HOSPITAL (INC.), PERTH, WESTERN AUSTRALIA: Junior Resident Medical Officers.

REPATRIATION COMMISSION, PERTH, WESTERN AUSTRALIA: Medical Officer.

ROYAL MELBOURNE HOSPITAL, MELBOURNE, VICTORIA: Medical Officers.

SYDNEY HOSPITAL, SYDNEY, NEW SOUTH WALES: Honorary Officers.

## Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment referred to in the following table without having first communicated with the Honorary Secretary of the Branch named in the first column, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

BRANCHES.	APPOINTMENTS.
NEW SOUTH WALES: Honorary Secretary, 135, Macquarie Street, Sydney.	Australian Natives' Association. Ashfield and District United Friendly Societies' Dispensary. Balmmain United Friendly Societies' Dispensary. Leichhardt and Petersham United Friendly Societies' Dispensary. Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney. North Sydney Friendly Societies' Dispensary Limited. People's Prudential Assurance Company Limited. Phoenix Mutual Provident Society.
VICTORIAN: Honorary Secretary, Medical Society Hall, East Melbourne.	Associated Medical Services Limited. All Institutes or Medical Dispensaries. Australian Prudential Association, Proprietary, Limited. Federated Mutual Medical Benefit Society. Mutual National Provident Club. National Provident Association. Hospital or other appointments outside Victoria.
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THE  
MEDICAL JOURNAL  
OF AUSTRALIA



VOL. I.—27TH YEAR.

SYDNEY, SATURDAY, JUNE 29, 1940.

No. 26.

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